MAY 1943

50 CENTS PER COPY

IN THIS ISSUE

DESIGN ANALYSIS OF THE BELL AIRACOBRA — a complete, detailed description of design and strucrol features of the famous sell P-39.

A NATIONAL AVIATION
POLICY
— outlined by Rolph Domon,
president of Republic Aircraft.

ALCAN HIGHWAY

— o product of oviation from conception to completion.

*
CONTRACT RENEGOTIATION

how it effects the aviation industry.

ELECTRIC POWER FROM AIRCRAFT ENGINES first complete discussion of he economics of hornessing test stand power.

OPPOSITE ROTATING
PROPELLERS
should they rotote inboord
paubboard?

should they rotate inboord
routboard?

*

PRODUCTION EFFICIENCY

— ow Consolidated increased its production rate.

INSTRUMENT APPROACH
BY RADIO D/F
-technique described for various conditions.

McGRAW-HILL
PUBLISHING COMPANY, INC.

"Well done Eatalina"

IALLON

American Seronautical Magazine

Born o potrol bomber, Consolidated's amozing PBY has engaged in battle as fighter, torpedo and dive bomber! Little wonder the U. S. Novy has prolonged the strudy breed with an order for hundreds more. In helping write this great saga, Twin Wasp engines are daily rolling up new records for denendability.

PRATT & WHITNEY AIRCRAFT

EAST HARTFORD, CONNECTICUT
ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

COMMANDOS of the Assembly Line ...



they're tough! SPEED NUTS are truly the commandes of the assembly lines.

They are tough - and fast in action They are now being rushed into pircroft factories where they are vitally needed on the assembly fines.

structural attachments. Conversion to the use of Speed Nots on all approved applications releases critical bar stock steel for other important uses Our Engineering Deat, will be glad to assist you in determin-

ion the proper proposed igentions where SPFFD NHTS mov-

THE FASTEST THING IN FASTENINGS!

TINNEPMAN PRODUCTS INC 2070 FULTON BOAD, CLEVELAND, OHIO Toller Boron Co. Ltd., Eurilian, Grayle Entered Account to Let Leader









May. 1943

Editorial: A Sermon in a Secon Song Wanted: A Neticual Asiatra Police Relat S Donne 111 Fight Testing is a Second Resisters, II

A Warr Creed SS

Instrument Assessed: by Sadia Depotion Finder

(i.d Operation and Training

The state of the s

WPS Only Part Proper Planes to War Service

In this Issue



Our or the most consumbation with. Many appropriations of find the party formings declaring for page 206. Arresped to a reference page of other population of the spready restaurabreaks the extraoring resolut ser- refers to distribed to ricked as page

and goes into the principal dream and

some for their selection. These discrete-

terfing at Beeing Arrenal Company,

Is not Transport Section in a per-

the auditary directory finder ery by describes on PAGE 209 has the Issued used dependably for estaclastory in Monorie breaks may designed to



metal formatic was reproduced a vice 227.

was rabled to as recently by our

ATTACTON, May, 1941

Dunco Guality INDUSTRIAL CONTROL RÉLAYS

Tongen on well or h

Although Servicer Dans, Inc. makes many more commonly used for constelling meters, been, highes, and for other industrial tooks.

made to many trace and with mountain strike for with for your copy of the Deaco Balop Tower Catalog and Date Book. Contains details on the largest has of hugh-mades mices and



STRUTHERS DUNN, Inc.

LET DUNCO DISTRICT ENGINEERS IN TH CITIES HELP SOLVE YOUR RELAY TIMES PROBLEMS ATTATION, No. 2002



true Paper Cub will carry you guickly and consumedly on santion.

TALATING CAVALIBYT' That is no adir decora. For the Piece L4. secreto attocko opoiget the energy . . . helded their own family representations of the properties of the state of the sta They reperhable maney embelty, they ability to load and take-of Alondy, these start, little places have around their worth on the

steps will dut the country . . . and light simpleses will dominate the sky, just as popular-priced automobiles dominate the road.

sed beings trip. They well reports and highest budge

PIPER Cub
POINTS THE WAY TO WINGS FOR ALL AMERICANS

AVIATION, May, 1848



WOMEN ARE UNDER FIRE. TOO!

An Ack-Ack bompos-even in ministure-is trush on a woman. Yet some of the hard and brilliant work they are doing in industry asset American women deserve a home life

So now's the firse to pitch in with everything wa've not to whin the Avis. That is the snirit Solar relies on to produce adequate numbers of "noti monoride" exhaust monitolds for the Sphine sirplenes of the United Nations



PART COMPANY . SAN DIEGO CALIFORNIA CELANESE CORPORATION OF AMERICA



Aero Quality LIMARITH protects against the invisible

"Blistering heat" can blance And agreest rentemped even. The streevasiet hand, can deliver a bring burn to corner during they lone Subta-That is why Acro-Quality Lumais specially processed (light stabileave-ned, to improve weathering dramable consumers the invisable!

from Lemanah pabes . . . transporess from Acro-Quiller Louisith sheets. tellertes military starring, as it does telephones to tool handles and gas

soons, Cleveland, Davton, Chicago, CELANESE

masks to expense to

CELLULOID CORPORATION The First Name in Planting

NOW... a specialized service

FOR PLANES

Hectrical Construction Materials including . . . Batteries Push Suttens Rodio Equipment

Cebls Cappett. Nonewtelli and Ferroles

Fuses

Instruments

Intruments

Connecting Blocks

Tubing, Flexible Plostic Wiring Davison

For PLANTS . PORTS . BASES Electrical Operating Equipment and Main-

tenance Supplies including . . . Intercommunication Airport Lighting Majors and Central Alarm Systems Swin-hose!

Wiring Devices



NOW... the notice's tending distributor of electrical supalies to inclusive has mobilized a specialized service for air. Recessaring regions of many of the most popular electrical plane parts and accessories. Groyber can serve as a "anecall" local source for materials that go tagether in servicethus mently simulitains your nurchasing problems.

A staff of qualified specialists familier with plane construction and requirements is now on call at Graybor offices in every aircreft center. A comprehensive catalog of aircreft construction materials, just off the press, supplements Greeber's 1000 room nessent catalog. For your copy of this new volume showing the scope of Graybar's new service, but mad the counce.



96-PAGE CATALOG OF ELEC-TRICAL SUPPLIES FOR PLANES

Planta road na year new Catalog No. GB-5515.

GraybaR Executive Offices: Greyber Building, New York



reduce could begin, dorotte and BUFFALO, NEW YORK

Name of Contract o Department

We will promotive since the Goold Report is year hands.

MORRISON APRIS-SEYROLD-POTTER COMPANY



Intake Duct in Curtiss-Wright C-46

to date on Morrison stitchers, thu 65%, according to time studies made by Curtie-Wright Corporation. Shows below to the operation to form a analyst for the C-16 heater cold sir duct.





minutes. Among other parts are during fermally, subrates abressely, halkbeads, rubber supercharger

DAYTON, OHIO



of .010 24SY aluminum bonded red Photo proctoschod) Doorstion of Morrison etitchers cells for Send for this reprint of Curtiesauticle on Metal Scitchton of uncraft perts. Write for this faculat day, on your letterbead.



STITCHERS

at least

time savings

made by Stitching

Revolutionary new

assembly method for aluminum. stainless steel. plastics, rubber. cork, etc., in aircraft now

proved conclusively in cervice



From the arrorati plants and into the sir they move! Thousands of fighters hombers, transports and gliders. In this wast airplane production - the greatest the world has ever known-need is essential. And DaWalt is playing an important part. DeWalt Cutting Machines-for metal and wood-are serving in the nation's aircraft factories. Sturdy, flexible, dependable, fast-DeWalt Machines do their work with a poscision heretofore unknown.





Black & Decker Portable Hec-Ine." At home, servicing visos front, servicing America's was stores . . . It is D Drills and Booch Grinders, Value Refacers and Valve Seat Grinders are used every day to bela-

PORTABLE ELECTRIC TOOLS

ATTATION, May, 1969

Doctor Fench Gender. Card for all note of over

Where Can You Save More Time with more March & Dealer Total? Oct in

De WALT PRODUCTS CORPORATION Lancaster Penneylvania

BOLTON SHIFLDED IGNITION HARNESS



Keeping the spark in its place!

in its ignition system, a modern plane engine has upwards of 30 lively spark "seeding stations." Unharmessed, they would sound like machine our fire in the pilot's phones. Reducing this sawelcome by-product is relatively simple. Eliminating it (very definitely o "must") requires this carefully engineered shielding homeis, now being manufactured for the Government in the Bolton plant.

BOLTON MANUFACTURING CORPORATION

692 CAMPRELL AVENUE - WEST HAVEN - CONNECTICUT

ANNOUNCES For Efficient

A Three-phase to Single-phase Transformer for Aircraft Provides single-phase power from a three-phase generator WITHOUT DISTURBING GENERATOR-PHASE VOLTAGES

THE new transference token the place of the neard angle-If weight only I've provide and a course out by the till by \$15

DESCRIPT PERSONALISE PARTY

you've factor in representative 95 per cent, with last at apwith the world war

Operation of

The redis company





Conductes to the St. S. Arms Air Count.

JOIN THE U. S. AIR FORCES



IN TIME OF WAR PREPARE FOR PEACE

> 1790, George Washington said, "To be ureneed for war is one of the most effectual Today, in the midst of war, his advice mucht For neary, like war, has definite objectiveswhich should be planned in advance. When victory brings peace, the contributions

of industry no less than statesmanthin, will help determine the kind of world we'll live in ... and sircreft will play an important role. important. At McDonnell, we're working three Armed Forces, But we're working too, soward the better aircraft and better materials which will be a part of tomorrow's bester world,

MONNELL Aircraft Corporation



For Rapid Machining OF SMALL PRECISION PARTS

In harderds of irrecence war renduction shows the new Series 1000 Seeth Bend Turnet Lather are first choice for machiging small procision parts. Harrily efficient on all work within their

Note through specific and Table 1987 Cribt capacity, read 2" Thronto-traphedo(40) 4s-22 Being conclude and critical steps . 1902" Universal correspondent forth-



BOMBS

rom a Planeless Sky

NIGHT to pe of Affect bombing in mode possible by the turbourser. which has sent our plance at they carryed be seen, and wed the reach of effective and

seloped by General Electric. U.S. Actor Ale Parent the turbo Constructed on the turbing win-

arven miles upo cuile, it utilizes the high temperatures engines. These mans drive the leaimpeller, and the amount of au shaded, ere be veried as required The intreller speed is very high The turbourney/harney consister suges of 1940 P. and outside atmos

It took applied science, engineering skill, and manufacturies seems to develop this extraordramy "tool." craft in peace as in this turn of yor. · Arrestt electric systems designed and manufactured by General Electral of many different flight operaobligation of these systems with denue and production engagery

THE TURROSUPERCHARGER, ANOTHER CONTRIBUTION AV

GENERAL MELECTRIC



As superior to present aviation fuels as they are to automobile gas

Well Imprace Quality of Present Asserting Gas

90% of All Constitutedly Counted Anistics Co.





sen hands . . .

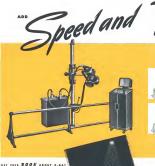


Organizing Atoms for a Better Aircraft Engine

A visitor at the Basser short once propoled: "Scotch a Racery

Division of Fairchild Engine and Airplane Corporation . Farmingdale, Long Island ASSESTION No. 1942





GET ROTH WITH THIS WESTINGHOUSE X-RAY LINIT

The Westrophouse Bull-Mounted X-ray Unit permits assessed speed and family) by in the wear department Rated at 140 ky opposity, if is especially suited for the suspection of highly alloy ports and moderate thicknesses of heavest metals. Its control is largely autometic . . . saw to edgest for proper exposure



SPEED TO INSPECT MORE PARTS FASTER. large, weektable, and radio; controls are surple. When perty marchs made, one after the are identical the redomination other, excely by myring the work is reduced to sliding the

und to the nest possible. Parts of uset along the rails and making



FLEXIBILITY TO INSPECT MORE KINDS OF WORK This unit also has the fleet counterbalanced telephanical and halfy demanded in today's pro- tabe arm permit the beam to be duction. Ideal for light alloy named, lowered and directed servers up to 7%' thick In creat accuracy. The extre unit

widthen it will produce aboty, occupant a minimum of floor detailed redisqueple through space, a large part of which is 1%' of steel; 1' of brees The evallable to positioning the work

- Industrial X-ray

lest out-the book containing wealth of pracplan and lay out the complete new department. Write for your oney today. Ask for Belletie, B.3159. Address Westinghouse Electric & Manufecturing Coxpany, East Petaburgh, Pa., Dept. 7-N.





plane talk

ELECTRICAL APPLICATIONS FOR THE

SMAIRN VOLTAGE REGULATORS are helping to lick problems of dirt, dust

CARDA SUPERCHARGER DELYES are now on test. They'll meintain uniform pressure inside the cebin regardless of altitude or speed. Westinghouse

STON-PRECURECY SERVING-Restinghouse engineering and development in

DYNETRIC BALANCING OF COMPLETE WHEEL AND TIRE ASSEMBLIES for planes

THERMOSTATS AND HEATING UNITS to maintain radio organias at constant

SURPRIC DEMERSION HEATERS for beeting oil at los temperatures are speeding cold-meather starting of planes. These units aveilable now.

For further information on any development or product mentioned here write Westinghouse Electric & Mfg. Do., Dept. 7-H. East Patteburgh, De. Westinghouse

NEW CARBON BRUSH LASTS 50 TIMES LONGER AT HIGH ALTITUDES



For ordinary low-sitistade fives, Mr. Ber et the 30,000 to 35,000 fact. exerc of new histosticule places. functioning at critical times. The same-

In America's fighting places, the mene the causes and a remarks. A new developed to affect the effects of those Pleasealls, this problem was resell.

FOR THAT CRITICAL JOB . . .



SAVE WEIGHT-SPACE-TIME Opening the way for more compact construction

design, the Aircraft Industry is specifying Hoto-Kunne Internal Westerne Boltz became they definitely do ages valuable Welcht. Space and Assembly Time. The internal wrenching feature Stringers, motors and wines to fasilnes. Hard-to-Kroens Internal Wrenchine Bults, You saday the Industry is saving Weight, Space and Time by

uniar this "better" fastening Method. NASC SPECIFICATIONS

Aircraft Designers and Production Engineersyou will find this boardest catalog (\$50 - 12"). containing disserutions, factual data and the NASC Specifications for Internal Wrenghing Belts, developed and approved by the National Aircraft Standards Constittee, a duly reference

THE BETTER **FASTENING METHOD**





AVIATION, May, 1945

HOLO-KROME

Internal HEX Wrenching

BOLTS

THE HOLO-KROME SCREW CORP. - HARTFORD, CONN., U.S.A.

ATTATION, No. 180

THEM!

Bearage have been known to crystolline within a few techniques for working such materials as hard rabben, If your hunters calls for the use of precuenc markets

Bryant Chucking Grinder Co.

10 Ways <u>YOU</u> and <u>WE</u> Can Help <u>Speed</u> Victory

A Mai-West mand distributer reconstruction of them on eight and batterment resultatures. Unless 325 fees of "N" Numel acids be delivered inmediately, prediction of a vital part world be held up. The respired mestal and delivered from that the arms day. Production continued of tap speed. Additional because was also supplied

mill a hipment arrived.

At also a 'clock on a Tundey overling, on Army officer drevs to a distributer's affice for a rush order of metal to go with a convey setting at down. The night verticemen planned weethers encylopes. The exide was filled a nime for the convey tenting.

With all metals and alloys on the critical (m), therefore seeds here attend are toper-times, ...) permitting a country-with pool of materials. Many exceptes ... haried the two shows ... could be cased. Less descrate ... has equally supported ... is the dey-so day strong provided by INCO distributors. No intriving complete and up-on-the information above Com-

and trueble for metal usuas.

Durnbranes sequire bessel experience in many undustries—and friendinisty with the final of urcheioli information made visibility by the engineering and research softial the Increasional Nikhel Company. Thus they are equipped to show about proper usual metals and they is and obtaining the control metals and they in and of the proper usual metals and they in and often.

What YOU can do:

- Condom. with WYB regulations. New regulaited are buing recent engages?
- 2 Piece year orders as early as possible.
 3 Telliour chrossas chosen consensas materials obserg consider by an desire a smokentory when cases only the observed increasinated. Others we consensually the observed increasinated.
- one may be absenced internel parties, there we extend the content of the content
- other equival metals: "Of class which ones reasons to the which verbook shorp studies; much save restrict."

 5. Depend women on-priori among distributed—bet an earth study certifier on primitable. Use not distributed—bet are considered from the metal distributed—bet are considered from the considered of approximation in priori glains.

What WE can do:

Arbeit on WTB contaminates, Special departments here fully inference on Convenience, size listener. Yelly ment, seem solve prompt produce at the contaminate and Arbeit March Nickel, leconduct and other special selection of the contaminate of the contamina

- Special creet and shapes in scole Social research conditions on penalth under warriages outle count conditions as penalth under warriage outle count for penalth allocates score or research, pages for penalty countries.
 - A Special services—such as carriers, thenceus of services to the provisional planets in the carriers as here; as needed hosps cancel sowing as carchineters; as needed hosps cancel sowing to carchineters; as needed hosps cancel sowing to carchineters; as needed to care contents to tende and careful southern and the careful southern to the tende and careful.

• Py working closely with the directioning by subsidiary displaying the work in mercial part cast, low can offer make support with and way a gradual rate of fin shed way conclusions of fin shed way constraints.

The Colompton Yared helm are Directionan and the Dict Dicts Nishel Allego Month 1: "A" MONTH 1- "I" MONTH 1- I" MONTH 1-

DISTRIBUTORS

Advanced S. 1. Villa World A. Amari C. G. 201 Secretal S. Amari C. 201 Secretal S. 201 Secretar S. 201 Sec

Farmer at Williams Congress Ltd., 199 Indead Ass., W.

Distributor Service

MILL...WAREHOUSE...FIELD
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, NEW YORK, N.Y.

Inco

THE DESIGNATION AND THE SECURITION AND THE SECURITIES AND THE SECURITION AND THE SECURITIES AND THE SECURITION AND THE SECURITI



test as Raybestor pioneered in the development and production of advanced frection agencie for extensions and undustrial use.

piping accounty engineered friction materials for the inhealt indistry. The week of the technologists today in other the specialized viewals friction, product of tomorrow, the day have to become the standard of the indistrin.

Revised Station

MITALLIC A NON-MITALLIC STPES

Planes start safer. Sly higher and make quicker stops with Raybeston







Nature's most tragic mistake

THE DOUBLING LITTER assessment of 16 habitate float mather possum cen only accommodate 12. At bach, there's a mod ecramble for the 12 stpples, and the fast entirely don't budge for 6 weeket The other 6 bobies test look on ... and site of stervertus

Notice and in business the fight for survival is equally vital Follow in least observed of observing conditions.

Sand reported Section they offect almost everything we louch. post-war sea Machine tools are essential today to the cutput of the food you eat, the circles you wear, your gutemobile, your vacuum cleaner, your washing mochine, your relatesenter. Machine tools not only ments new industries, but they must employment. Lather will be even more exceeded than they are now.

storotoxis of history data and home your bastom before





BIG. LITTLE and IN-BETWEEN

The Aircraft Industry has recognized with everincreasing orders "National's" shiftly to produce and deliver a wide range of sizes and types of A-N secretly fasteners, to the rigid specifications required and in the large quantities demanded.



THE NATIONAL SCREW & MFG. CO., CLEVELAND, O.

AVEATION, Nov. 1865

THIS "CYCLONE" WON ITS WINGS IN A TEST CELL!



"Getwar" again and again as though in combint, -theretical down as infoling to a landing, -- then reversiup as the resease upon of an power-dree --, displane engines most wis their vieiges in text cells foolity, before they locate she facilities whose they are another cereflection of the state of the state of the state of the Well's Head devision Old for landshinged and not cere. New location of the landshinged in the ceretical collection of the state of the state of the Post Product of supers ever man 2020.

For treastriction years, which is food has contributed in the match of Artherin progress—so the developing of their

denome. Glippers have nord Wolf's finish for over 14pers—more than own anxiety susangueration. Welfpers—more than own anxiety susangueration. Welf-Hood has been shipped all eround the wold in haps quantities for use in United National plants. The laditaty can depend on Wolf's Blood, for Wolf's Blood has ever them energy loop pare with engine development. As better cappies on the Self, Wolf's Blood will have the efficiently for them! Continuous contribution to Avortion is no stringed part of Wolf's Blood policy.



- Aviation Oil

— Aviauon Vi





Come on, desequentials, get goings?*

Joight you one, Miss War Winner! And
give years been credit for knowing a ming
or two. He knows that was production
colls for speed — that electrical energy is
former, come less then human energy. He
former have march come if series you.

and provide

the much effort and fatigue year's sparal. That's impowess it were predictive, and it percention, who

That's why year hose provides 22p-lifes — on make things
ensist five you. That're simple to operate, eary to mount to
hole, jib, or trulley, not they play itsee any meaderd lighting
circuit. The Zig-life is the only small houst with this fall magnetic peak-bount control.

General Office 4991 West National Avenue, Milesankee, Wis.
HARNISCHFEGER





Lut these quickly, cleanly and accurately





with these VARD precision taps

In completely remorrange convolled departments, equipped with the newest and finest of production machinery.

and are tessed on asse testing internments. We use our own raps in our own production plants making war materials. We design for high output. Very few VARD Taps are carried in

stock. We make typs to order to fit your exact need. If you will furnish you our secommendations and delivery





· Arrest Smed Party

* too her fond * Pair Server Der Sans.

Alloy Steel helps a Flying Fortress "Sit down"



A SUSCEY landing with a 25-one draube extenders—or reads of allow streets

terrife shock leads to landgar means, can Arrendt Quality Alloy Stocks are per-

Quality-starry. To earn'this rateg the

CARNEGIE, ILLINOIS STEEL GORPORATION

STATES



hose clumps that were made of strapless smell Wrock Aviscion Hose Classes, lesswe as the standard of

ing Co., (105-11 Wes 16th Place Charge)





Revolutionary new Danadaing OE gives percelute coré broider dip the necessary springions without distertire, reduces relactions, increases profession.

A manufacturer of modulum for briskling parachron could had difficulty in house receiving the bobbins clay, one of the visit pares.

A more quench was no account, counting note distourtion that each clip had to be correlledly straightened, which required the expenditure of hondred of rum hours each month in usins of this there were more relections.

Casestical quenching all would not give the memany springiness in the clay. Consider on the problem, a Gulf Service Rugineer reconsumented Gulf Super-Quench, which achieved the necessary springiness without dissartion. Results a substantial increase we productive, reportion above casterly eliminated.

In plans after plans, this recobiniously new quantineg ail is achieving remarkable create. Many porm for the weapons of our armed forces we being made hander and measure with Guilf Super-Donnth than was ever before.

possible with all quenching, And yet Gelf Super-Quenth weight interestin and continue, Herein the Important remon why Gelf Super-Quench is a superior operating risk it has duel autiser—a finite cooling case through the hardening temperature maps, and the slow period of consuminating temperature and the slow period of consuminating temperature with the hardening temperature singer. But the hardening temperature maps, the hardening temperature singer.





GULF OIL CORPORATION

GULF REFINING COMPANY

PITTSBURGH, PA.

ALUMINUM

HEADS are just one of the many parts for America's fighting places where Howard nonferrous costings are effecting weight savings-savings which impart higher speed or greater fire power, heavier bomb loads or more sub-As the nation's largest jobbing producers of magnesium and manference causings, much has been expected of as in the war effort. We are proved of delivering more than in the war effort, we are proud of extivering more than abaniaram, brass and brouge for America's planes, tanks. task destroyers, ordsance, ship and armament-making Nonferrous castings from the three Howard foundries are proving their value today in a seriad of armament applications, mony of which are quite new and of which applications, mony of which are quite new and of which nathing one new he told. These men, however, are definitely indication important properties analysation for abunitoria, bross, bronce and manuscrium coefficies in which the Howard foundries are due to figure prominently.

May we help your armaneous production with better purferrous coalings?

For ormoment today —

for willity tomograps.

Howard Foundry Company



Aircraft Builders use H.P.M BLANKHOLDER PRESSS For Today's Mass Production of Deep Drawn Metal Parts .







A complete line of T&B PRESSURE
TOOLS

for installing

STA-KON







NICKEL



THIS Y & B line of computer Pressure Tools speeds the installation of Sta-Kon (solderless) Terminals onto all wires, sizes =22 to 250 MCM (=22 to 4 0 Aircraft).

Choice of Any Power

MANUAL, ELECTRIC, AIR, HYDRAULIC.

There is a tool for whatever type of
power a plant may be using.

The speed of power-operated bench modcls is limited only by the exposity of the operator, and installs up to 8,000 a day—

without fatigue.

make perfect installations.

Easy Work for Untrained Hambs Untrained hands can quickly leagn to operste my of these simple action tools, and

For All Operating Conditions.

There are small near hand tools for installations on niveraft frames. Rapid action

bitions, and harriers assemblies. Portable tools that can be wheeled or carried from job to job. Feels for instillations in the field where power is not realishing and where quick corresponsy require as mostled. For any unusual tool requirements the T & B Equipoceding Department stands ready to offer colutions.

Adaptability Every T & B tool will stake at least two

different sizes of Sta-Kons. Some are designed for installing as many as nine sizes.

Any T & B foot-operated tool now in oper-

cylinder. Also, die sets with indentor and nests are available for a plant's existing power press equipment.

Approved

Every T & B tool makes installations approved by the various branches of the Armed Forces, and other Specifying Authorities.















ALL T & B Sto-Ken Pressure Toob, turge or small, work on one basic principle—no matter what style or size Stu-Kon Terminal you wish to install.

These engineered tools produce in the bronze barrel of the Sta-Kena L-O.N.G. permanent indenture. Once staked, the harrel exerts tremendous pressure all around and throughout the wire and cable. It compresses the strands into one solid mass and netually becomes a part of the conductor.

The "stake" is visible evidence of a mechanically perfect and electrically sound connection-one that is vibration proof with

high null not value. Under the T & B Plan-these and all T & B products are distributed

through Electrical Wholesolers exclusively.













Behind OUR VICTORIES a SUPERIOR TRAINING..

Victories in the Air cripinate on our home front-on the Army training fields where our Pilots receive the thorough schooling that preserve them for combat.

The Bember Pilet in training must have absolute confidence in his equipment, in erder to officie the concentration on accuracy required in modern proclains bernbing. Complete engine reliability is of atmost importance in polician that assurance. Jacobs Engines never more twinsengine Training Planes then all other explices combined whereuse they give the flamber student that freedom to concentrate These efficient, reliable against will give the same feeling of assurance to Com-

mercial Pilets and to the Euripean Man and the Seastamen Svine their own places. ofter Vietnry is arbitrard.

A SIGNAL INDICATOR THAT OPERATES BY THE CTED LIGHT

SIGNALITIE







Litteliuse SIGNALETTE is a new sincert indicates for aircraft and other puresus. Indication by SIGNALETTE is by reflected light, daylight or ortificial - by "block light" - and by functional regionstics.

-BUTTERFLY" The SIGNALETTE body bouter of

NO BUILD-NO GLATCINO NAMINIS

indication is free from the blue of Soment lange. Olore is obsent in any light. No dimening is necessary. SIGNALITIES light sizes and finder

furnimescence. It signeds clearly in tetal derkness and brightest synlight. MARKED SAYING IN CURRENT SECRETETY was not 2.25 water.

Complete data. Wire as write

NON-SHATTERANLE PROTECTION IN terrs. Available for end, green, am-

4757 RAVENSWOOD AV. CHICAGO, BL.

FOR DEEP, MEDIUM OR SHALLOW HARDNESS THERE IS A COLUMN THE COLUMN

If you need a deep hardening steel, you will be interested in Gregi-Sil. or Graph-Me Steel. If you require a medium hardening steel, implies about Graph-Tung Steel. Graph-M. and Graph-M.N.S. are shellow

All five of these steeds ere easy translating, long wearing, and nonselizing or non-deforming tool and dis steeds that offer maximum resistance to alternion. As in shown in the chart below, each steel in dealgrad to do a specific type of jab.



How and why to memorize

Van der Horst

Think of an aircraft oughte— Form your mind on the sylvider wate— Think how they wase—

You der Hoset is the separation with the process that multiplies cylinder life. This not only extrusts ragins life hat also accesses efficiency. The surveys in PORCA-ROME.

It is the application of hard chemisms, of controlled possily and innoclases, to exhibit here. This is concluded new under the sun. Tet are new. The uncertainty is well-proved, it has been

been in successful, regular to be Europe. Was brought to this country in 1999, libro new punced full recognition and acceptmen here for critical registerences. You'll hear mark years of PORUSA BOME.



PORUS * KROME

Multiplies Engine Life

08, Mr., 200

AVIATION No. 1819



7/OU PROBABLY remember the huge with the larger you had over feeland number of bombers you lost over England a while back, don't you? And most of them from those -: \$50.20** @8"5%!" ACK-ACK guns, too!

Well, confidentially, Schicklaruber, though we con't tell you much (those ours keep things so dorned secret ground here). we can inform you that we had a little port (not much, mind you, but a little) to play in that show.

Above is a photo (sorry it's been pointed out so much) of a that we had something to do with, and that had something to do with samething that had samething to do

Now, Schicklaruber, this is strictly con-Edential, and we don't want you to tell it to a soul avent maybe a few of our

customers. We may be able to fix up something as prouvate for them some day. VINCO CORPORATION SEAS SCHAFFFE HIGHWAY DETEOUT MICHIGAN



BURRS...BURRS...BURRS

Burrs everywhere . . . but



THE LEA METHOD AND MATERIALS remove them easily and economically Note the many herrs in the castines pic-

Curn Froiscorian Company of Meridan Connecticut, makes oil filters . . . those highly officient filters used on airplanes and tacks. And their efficiency is due in large part to the successful utilization of the principle of "adop filtration". Oil passes has twee specially shaped discs compressed almost solid on sody

Where does hurrien name in? It is about lately assertial that every potential ties particle of metal he removed before the filter is assembled and placed in operation. Should any New particles within the filter drop off, they would, of course, defeat the very number for which the filter was tured above. Imagine the task this would he if all the work were done by hard. Imagine the difficulty of mainteining telerences in the measurements, if the burning ware does with files or metal horry.

Hore is an excellent example of the way LEA Engineers halo massifacturers. Co. operation with Comp production officials they worked out a simple, effective and economical method for removing all burns and only on the cartieor but on the discr. Why not investigate the LEA Method of Burring for your operations?

THE LEA MANUFACTURING COMPANY



Apriles, Bullion and Polithing . . . Specialists in the Development of





this 6-ounce filter may save lives

Skinner engineers perfected this midget fifter to rereave particles or contemicents from the artificing that before it reaches the Meterley Fixed Purp... and is this function the Piller helps persent formation of ice on the propeller... wind held, and in the contemeter.

If you have filtering problems
on for our angineering help
war water for a copy of our
new caboling.

closely confined areas. Unakilled persons may quickly remove the Filter Pock, clean it and reassemble it without special rooks. Skinner Filter Pocks are standardized to persit irreddiste inter-chargeobility of parts.









Waldes Truare presents a significant advance in retaining rings. It spreads or contracts without dis tortion; always retaining its perfectly fitting eircular contour.





For all thrust-lead fixing, and shaft and bousing applications, Waldes Transc provides distinct edvantages over nuts and balts or wedges and washers ... it reduces dimension and weight ... saves material.... cuts menufacturise time.... signifies assembly and discoverably. On request, we will dodly foreigh sumples and full date for your tests



What happens next?

THE sures the plane bits the water a time A release mechanism gues non esten ..., and-matically. Our of the plane pope a relabor life rate.

field of compressible gazes. Calculers for ourgen Thurks to increased production, Kubbs crim-

AVIATION, Mrs. 1811

AVEATEON, No. 1815

WALDES HON . I . MOOR . INC

LOWO SELEND CITY, N. Y.



When Hair Splitting is Crude Work

Split-bair accuracy for't class enough for today's production. You's have to be specifically designed and lead to hold the work to the sexuable tolerances now pressured on more seets. And that's #MCKER spreadly.

Proquestly the character of the tool, yig or fixture is the difference between postules work at nervel speed (or less) and the some precision work or

RECKER tool expenses are serving a wide range of industries, whose mannered Ma- an industries Blue Book. This accumulated experience with men and markets of all types is nearly to teckle your tooking problems.

Furtherman, these organisms are in close contact with the **HECKER** production of pressum parts for leading sizeast manufacturers. They know at firstland has their and design are perfectable.

Give us a real tooking problem to solve for you Docum at me strongs attached, with one of the MICKER field engineers. Write to A. W. Hocker, 1978 East 86th Street, Cleveland, Oliva, or, 527 New Contra Braiding, Delayer, Michanso.









ATTORCHAFTS AND DRIVE THREE PART \$100 B SCHOOL SANDAS IS C. A.



New Manufacturing Techniques

New engineering processes of Hervill Corporation are daily contributing to production increases from coast to coast. In the wor busy plants of today - the page plants of tomorrow - design and production engineers have found the advanced Hervill Corporation methods time sayers.

New Techniques - new materials - an entirely new and advanced average by engineering and production personnel is the enswer. Here is an organization goared to the best, fastest and channest method of solving your production problems . . . backed by the equipment and knowledge to accomplish temorrow's job teday! Write Hervill Corporation's Inchaired Service Department today for detailed information about its products and servicel

Endon Representative PROCESSES CORP.

A251 West Contary Blvd. . Los Appeles, California



hardage established by world speed recents on land, weter and sylfes air, garend over musy years past, which





Our fighter pelocs are writing fabulous hissor

USE CHAMPIONS AND FLY WITH CONFIDENCE

CONSTRUCTION L. Emmonary from host and chemical systems

3. Soberesty bigh host confectifit with con-5. Herrogeneous scrueture eliminars air apaces

ATTA9105 . May 1941

propert - "Devils from Heaven" - who are

What makes these fiving Yeaks tough a their who knew how to fight And what mokes seerel Offices, 8 Se. Hickiges Are., Odrage

MAKERS OF THE WORLD'S FINEST PARACHUTE AND BELT HARDWARE





SAVED 6 OPERATIONS

in Mounting These Studs

The Old Way-

operators, Bennisser welding it mary to smooth Q-E efections county

Speed Production Electronically



The Borlin radio was silent last night. This morning we know why. The Yanks again! What a performance record these big war birds are setting for going places. doing things, and coming home. It's precision examplified. That's the insulvation of every worker here at home, to make every plane part a model of precision.

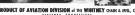
In Aircraft Hydraulics, Fuel Purces.

Air Parers, Releted Accessories... PERFORMANCE POINTS TO

MYSHON CORP. WARNES, CLEVELAND, ONIO

GENERAL & ELECTRIC







Ligitarijāt, Conpact, Pearofol-



"SUNDOWN"- In the Morning!

Silhousted spitizer a morning sky, as American plane crew worth or "Russic Sun" ships been forcely—the result of perfers coordinates between plane, every and equipment ... Barked by 33 years' experience, and designed for war - oficions Engrape Signature marges are a dependable part of Albert wecents, responding instanty, unfallingly, to Sugar-up controlgiving cow members extra time to concentrate on the target. THE EMERSON ELECTRIC MANUFACTURING CO.



MOTORS AND APPLIANCES . A. C. ARC WELD



Locking Nata Recover Basta Note are so much Righter than other mets, our neval aircraft can cover entry rollings of previous fact which sucresses the Navy's erriting power by handreds of soiles. The lightness of Boots Nats can also mean extra formower for Book Nats are sharple...biresile "outlot the class." No obox whereign can loosen them. They can be re-used time and time again. Boots All-Metal, Self-Locking Nats, used on grapy true of U.S. place, must the exacting specifications of all government agreemen. A recent addition to the Scott Swite is the new all-ward "Rol-Tim" out it is esertally desired for entire scolication and has existed wide accordance among manufacturers in that field

BOOTS

Hose Clamps

NEW...and BETTER...

Meeting Every Important Requirement of Army Air Force Specifications.



UNIFORM PRESSURE ALL ASSUME

N offering these Host Clarge to American industry, and expecially the sylution industry, we believe we have ourcented in providing a desira distancehol for both performance refubility. servicesbifes, and selectifity so the work. high carbon spring seed band pranched with bodes consupposition to the nexth of a worm year. The

worm or take-up screw is of heat-treated Nighsouther curbes street, precision suspend and presecup which prevents the screw driver from the play and percucing the here or maring other band and small booting on the take-up screw. * EXTREMELY COMPACT * PARID ACTION · UNIFORM PRESSURE * INSTALLED WITH HOSE

• NO LOOSE MICES *SMALL NUMBER OF *STEEL OCKNING *2" TAXL-UP IF NEEDED SARITY CUP ON CONFLIES WITH AAF



AVIATION, May, 1845

They Seve

Millions of Pounds

of Precious Metal

relifion pounds finitess. In addition

responsible for excepts, even

Book "Care" Not Tile selve





Blueprint for Victory!

shay fact a sheaf of drawater . . . a ceeing, new bluepeints.

this has medium bember couldn't curry the weight of a single set of bulk. By the end of 1942, the

WTHEN sixends designs are passes without modification or released by nessen companies change to keep per naturary arand the second of the second o turn, what do they causit of? Are and such chance means seri engin-

Accountly, the bluegraps of a plane. Bold variou, Marcha counters are welolding a bloopeles for Victory THE GLEDT L. MAXING CORPORT







Extracer's Delight a ten passes



GRAND RAPIDS INDUSTRIES, INC.

can give you experienced down to earth production ... and fast THOUSANDS of Army physics and sizes obliga-



now in the sir - bear testimony to the facilities and executence of GRAND HAPIDS INDUSTRIES to receive in volume to granting aperifications. If you need production in wood - solid or luminated --GRAND RAPIDS INDUSTRIES is at your service with complete from literally hundreds of fast, modern weedworking machines. There is available a total of more than 254 million feet of productive floor

enate, with amole, immediate labor corece. GRAND RAPIDS INDUSTRIES, Inc.









SIX NUTS THAT BRIDLE A THOUSAND HORSEPOWER

runns is the business end of a I powerful Diesel sugine. Well over a thousand harre-Become soins through that comline - through those six study. To connect that coupling, oldstyle lock fastenings wouldn't do. They couldn't both look and

exemby. So study failed. The solution shows in the shota - Floatic Stee, Nata.

With these fastenings, uniform representation with the property of the second carrolete socurity against buts working house. In the neartime production to came, remaily nurring arely



lens will played manufacturers. And we are prepared to belp. Our envisors who today are lean will be ready to share their wide experience with you.

Whenever you have a fastening ich let zu know. Our men will work with you on it and recommend the correct Elastic Stop Nut to readuce a better product or to facilitate its manufacture

ELASTIC STOP NITS Theory New York Concession or Assessed Print, New York,





It Is "Tailor-Made" To Do The Job You Specify

The Cook Belleve Switch is "take made" to seed your Cook Sollows Sections out to provided with accountly Various solved helicons can be supplied, depending on the pile to be handfed. Cook Tellino: Sectable will be our The Cook Bellow Swack can be operand with me, passe, or Rade . . The mitching mechanics, which the "Spring Safe" Bellow mat will mady melant, one have





Dusbriges for Industrial and The owner of "Spring Life" condition

Send as your openious and we shall be glod to you

Above: Mit.1 in feater weather NH-I FOR THE NAVY **Outstanding Single Engine** Instrument Trainer of the Year

Howard Aircraft's



Increase His Margin of Safety



of vital engine ports state strength 25%, in taxand threads in light metals, it prevents

est of a power often at \$60 m.p.h. And his chances not much better if the "AFEO-THEFAD" SCREW WHAT IS THE "Arra, Through" SYSTEM? The "Assa-Thread" System Increases beligge resistance 100%.

steel fangings, it provides a high strangth screw, prevents thread seizure or welding and eliminates thread chaffing. cal call lines for the topped hole. Made of phosphor bronze or

The "Aure-Throad" System is widely used today in many egel-

"HELI-COIL" INSERTS FOR CONVENTIONAL THREADS





Bigger things are coming in the serial transport of troops and equipment. As sirliner speed, mammoth planes

parts and paratroops to distant combut areas. As in the case of the most famous fighters and hombers, these transport jeeps, spare engines, repair planes are usually Berryloid-finished,

BERRY BROTHERS, MC.

MONTRIAL . WINNERS . YORONTO





AIRCRAFT SCREW PRODUCTS COMPANY, INC. 47-23 35th STREET . LONG ISLAND CITY, N.)



STAYNEW PIPE LINE FILTERS KEEP AIR. POWERED TOOLS WORKING SMOOTHLY

Remove Sediment from Liquids

Fliminate Hazard of Oil and Maisture in Automotic Controls Many special was line fitten available, meladore

STAYNEW INTAVE BILTEDS MAINTAIN SECURIOR OF ENGINES AND COMPRESSORS

Stevers Intele Pilters prevent



STAYNEW VENTILATION BLITERS HP WORK. ER PRODUCTION, REDUCE BUILDING CARE

tenance, adding to efficiency of



HAVE YOU A FILTER PROBLEMS Sparint Aircraft Filters Besinned by Stavnew Engineers

COMPLETE CATALOG

STAYNEW FILTER COR



IN TO THE SEAST PROPERTY OF CHICAGO, AND WHE IS PRODUCED A MIND AND AN INCIDENT ABOUT ABOUT OR MAN, THE ABOUT OF MAN,

The Fact-Power OF KARDEX AIDS IN REDUCING ABSENTEEISM

Absentagion, It's become management's "herrer" word . . . Wa've all familiar with its file and described allfacts, and how absenteeless grows every at the foundations of good management control . . . during up arm

senters and getting at chronic offenders . . . Individuely; it can be dose by well-alread, efficient record engineers have developed such an "administrative tool" to help you cape with a much ten providest availables.







primarily heatens of was an obtain an

parades, run conturb, bank night Records, formed under gless news soon planed near three-finds or any other facul-point where all employees will be able to see that signalled artestance reserves







the being per most the problem of the

month of previous represent Solonce of the card curies a depletion of the card curies a depletion of the card curies and proceeding record with space devoted to mostlike caps If you would like seen inhousehor, with sample forms just phone way.

SYSTEMS DIVISION REMINGTON RAND

AIR CUNDITIONING for our Fighting Forces! American planes have proved their supenority in combat; wresting the initiative from the enemy and making rapid advences by other of our armed forces possible. Supremary in the air is the result of the stunendous effort of America's aircraft manufacturers. Back of them are the hundreds of makers of aircraft parts:

parts like the tough, stress-resistant forgngs that Kropp supplies. The great new plant of the Krone Force Aviation Company is devoted exclusively to the production of drop forced aircraft parts, with ample facilities for turning them out in any quantity and on time-wine stret fessions annine landing gear, linkage mechanism and bomb rack forced parts that are made to with

stand the most abusive service in flight To aircraft manufacturers, we offer all the advantages of a specialized production forging service plus a knowledge of

the importance of keeping delivery promises.





5301 W. ROOSEVELT ROAD



urders of all time

This is not a placement above. We are about to name the not the vesse he had offered to the world. It was the It happened many years ago A man named John end progress to the people of his country . . They told difference, hampered at the closed doors of nolitical

en overfore el narcepo pille, but John Fitch was

We have a purpose in telling this stary. It's sweply

pidty and nobical bindues killed John Fuch -- but

Reinwood Torret Lather . Fay Schmatic Lather . Automatic Thread Grinders . Detical Comparators . Automatic Openius Die Heads

JONES & LAMSON MACHINE CO., SPRINGFULD, VERNINGT, U.S.A.

Translating MOTIVE POWER into Fighting Power





SIQUXAIRCRAFT

WET VALVE SEAT GRINDING MACHINE for INLINE and RADIAL motors





Are you one of the many companies who are working on sirplane sobcontracts? It may be the first time you've worked with aluminous, and the job is strange to your peoplesen. You have received materials and specifications from your urine contractor, but you may need detailed information on some particular phase of the fabricating work.

Aluminum Company of America has prepared both literature and taskinstruction motion pactures which are available to you. Often, this material will narwer your questions adequately. In some cases, however, you may require help on specific problems. Alcoa engineers have angest a lifetime developing the best methods for fulricating aluminum alloys. Perhaps we've already belond some airplane builder solve the very peoblem that has you stymied. We're anxious to nam on all such information as will seed the war effort. Or, if it's a brand-new probless, we're ready to get going on

that, too. A letter or telephone call will start help on its way to you. Contact ALUMINUM COMPANY OF AMERICA, 2182 Golf Bilde., Pittakurek, Pennsylvania.

ALCOA ALUMINUM



In the Watton's Service



With every effort dedicated to the existing service, the even and weener of feesale are surroug out on exercisativisting values of west equipment for war. Such products on breeze Rodin Ignatus Sholding, Contridge Type Engine Storters, Majigle Servicel Connectors, Florible Condus and France and Alexander Armer Note the last of few of the many well-known frames about new in cation well the

United States Arms, Nove, and Air Forces, Secret employees are duing their part on the economic freet as well, contributing 10% and more of their pay for War Bonds. At the some time more bundends of Breeze workers have goes into salitary to fight on butterfields the world over To them can pledge is a pledge of preduction-head production for ultimate Victory.

BREEZE CORPORATIONS, INC. . NEWARK, NEW JERESY

For your highest skill-

HI-DENSITY LEAD

The basis of more opaque tracings and sharper, clearer blueprintsand the exclusive advantage of MICROTOMIC "VAN DYKE" DRAWING PENCHS

The superior coulding of #URSID leads are best measured by the M-968STY DS they produce 1 Uniformly opaque, and more sharply

- white when blueprinted.
- 3 Drawn without pressund into the paper-and easier to erase
- 4 Always uniform—because produces even-accurate
- MICROTOMIC STADIOS

Granden Phone Production of the Consequence Area, diviniging Mrs. Printed Street Com-

Microtomic VAN DYKE Drawing Pencil

D "VAN DYKE" EBERHAND PARELYS.

THE PROPERTY CHANGE PROPERTY PARKET WITH THE MICHIPPING LEAD.... IN RECORDS.... AND A RESPONSE ALSO WITH CHANGE PRINT





Again, another valuable contribution to your file of Aircraft Data

You know the trouble caused by the abortings of ATA-907 and ATA-668 Transization-caused by the fact that southers is there sufficient was almost produced by the fact that southers is there existing the abortion of ATA-629 and ATA-639 and ATA-

by areas of which you can briefe both of these buttlessies—without any change in design, discession or intring of your control.

These new Terminals are precisely sixtenhauge side with AN-665 and AN-665. Data in connection with them belongs with any collection of information on aircraft.

To shitch is once, write on your comment's

BAIA. Interhead to our <u>Detoils</u> office.

AUTOMOTIVE AND AIRCRAFT DIVISION
Dop. T, 6-205 General Melley Studding, Delvas, Michigen
AMBRICAN CHAIN & CABLE COMPANY, INC.

BENEFICIAL PRODUCTS: 180 Let August Automatic, and Instanted Control. 180 (OC Annual Termina), ARTICON Color Windows, Transport Special Special Color Color

AVEATION, May, 1945



SIMPLIFIED DESIGN

*Aircraft Contactors



simplicity of design eliminates

Forcer Ports—Sensides Assembly, Contenture can be brea down and prossembled syllood absolute prolocutation. Assembly is not made to the brea down and prossembled syllood absolute prolocutation. One proceed the property of the property of

Nex vy Dely Cordenie. Long, brothelms like in mored by thick diver also control go with figure of the second section of the second section of the second section like the second section of the section section of the s

Res of parliamations ID anapter contract volume parties or strape (2000) 997-001 INCVinate of parliamation ID anapter contractive volume and III anapter (200 anapter), II 0 periods, and 200 anapter, I 0 periods.

10, 100, and 100 anapter (200 anapter), II 0 periods, III of the anapter (200 anapter), II 0 periods, and III of the anapter (200 anapter), II 0 periods, and III of the anapter (200 anapter), II 0 periods, and III of the anapter (200 anapter), II 0 periods, anapter (200 anapter), II 0 periods, and III of the anapter (200 anapter), II 0 periods, anapter (200 anapter), AIRCRAFT DEVICES

Eliabetical DEVICES

An military and ounsement securit demonst
in any increasing years yet also better all increases

Long ligrary by other yet by specified the

long, ligrary by other yet by specified the

seconary showing control (driver him to Dirtot, himse Dirtot, historyales, and Los Angalos lashouse. In Solamus Diriton steeled here are not requested to produce association association of the solamus of the solamus control and though Secure Director as nearly 10 U.S. and Canadian office to nearly 10 U.S. and Canadian office.

SQUARE D COMPANY



Adequate checking and measuring emiss-

new Agency or Expecting

Compared, safe, restructor storagemary decree conditions can usb manuscratisfies they

gages are swelved, then are noted to all d builty them-

fore proper or counting for company of all times excels. denuation of the major system through drives in GREENFIELD TAP AND DIE CORPORATION





AIRCRAFT FINISHES



APPRARAGES CALLS, ALBORETT THEY nemern fontonic under nermal O SHALLESS AT MARKY. seaverage. Over 105 by weight. PLACE PROT. ... Crist. 80°S., 116°F.). property Total Law.

Walley, reception after 5 bears neing sind annuares. steamt 1/0" ret after air-crying Di Boura ant Jultine et 170"-per? F., Cor. 16, hours. enthanes for Chiebles contact

SAMERIC PROPERTIES. TAXABLE AND

season. This excluses to their for use or placed alresors as an sit in chicagas a secoth rapiace. It is remarkatural from clear weblick and in Contests Sector, Specification 2012. This combines

* Write laday for complete details an other Specification Fielders . . and remember that our laboratory is at your service in the development

TESTOR CHEMICAL COMPANY, ROCKFORD, ILLINOIS, U.S.

then I beared to cant is too-

Build Hangars, Shops, Barracks

with Multiple-Function Celo-Siding!



CELO-SIDING Combines Siding, Sheathing, Insulation -Saves Critical Materials, Time, Labor!

For temperary structures around saw, multiple-fuggroon Colo-Siding offers make enclasive educations in

ATTATION, May 1942



capon. All sports to be seeied with

realting compound Mail the courses

ELOTEX

ROCE WOOL . GYPSUM WALL BOARD . LATE

PLASTIR . ACQUISTICAL PRODUCTS THE CELOTEY COPPORATION . CHICAGO

on long roles. The C wido's have



"BENDIX" LANDING GEAR Simplifies Your Designing Thobloms

Because "BENDIX" Landar Goar can be adapted studyly or redesigned without accrificing the advantages of its base principles of operation, the plane manufacturers' design problems are greatly

operating, the prior minimization county promises are greatly implified.

Bindix neglicities work closely with the leading Bession Briefly consoling and problems of takend and landing, Bession Briefly consolines all future—minding wing contours, weight entiretistion, strough regimments, placement of steats for the most efficient extraction and long performance, and minimum stopping requirements—III-DINY Londing Garc is being prefixed on an even

increasing number of the new planes.





South Aviation Corperation South South Indiana

LANDING OFFE

TRANSPORTATION-a vital war factor

The effectiveness of our armed forces and civilians alike depends on the efficiency of our transportation

Hill publications, teaching more than

At the lattle of Timens extend in final planes, with the British and Ausensan issues, puring Jurob to crosed Reservati iron bits like 1855, both, Hiller and Manisake hald their british is at most reacting, the state of the properties of the properties of the Barten make, was the visib of a speechly propaned "Survey of Constructal Reserva", 'Improp the left of a granular and the time of transportation. Hiller has a grant many headdress these days but, Hiller has a grant many headdress these days but, hower of Economies, 'the certain problems of the whole Comman our offers to tempopathetes,' Ill is in first, the

suberly common of its macul majortance and Mr Bales arent water when he scells the gigants assend collectors which led has to neglect by missays

One the second section of the second second second section $t_{\rm eff}$ and $t_{\rm eff}$ and t

General Menagybranevia, 1,500 reals advance but Naccober and the vine use that coordinate the Naccober and the vine use that coordinate the same of the Parisis, make the farth obvious. Pence will count when two near using special countries usually a upply of first, of and mishber, for or trong central mantains depend all the schuckes at as well use of pence.

three entireli materials depead all the schecks of waris well as of pose.

As arms med to tracel on its stameth. Belies at tracels on its first task.

On the locus front, transportation is no less satal. Here it is executed in getting the war sockers three mas materials and their goodnets, by and from the for no tengle group of carrier, froght or powerger, conmeet all our recols. The unbroads open of our nation and continue to be the backbone of our transportition

> more than in 1941 and 24% is see getting noter work out of ad dath revie of brick than ever lecture. Private operation o railroads to persons for more effective and offerer

more effective and officers in this war than did gos coment openions in the last war in contrast to Hitler's

the American indensity but and ingleted their plant cocqui wakers greatment purcture ferred them to do so. They we turning in an impreedmented performance despite the Yong stirathous period to which their were period to which their were yound to which their was Yorld Wir this total are est street in the American rule.

640,001.010 State the State of the State of

Journage endeate of the unknown feathers, changing the period seeds of allows war in their personers in coping with the inconnect of oil to the oil Court. In Justim 1942, one menth following oil Harbor, the indicate data circle to the Earl Court task on less than 100.000 harrish data. But sheer they had stupped this up to racer than "30.000.

DENTES / CHIPMANN AVIATION, May, 1949

averaged most than 900 000 harmle per day. By the ead of this year they are shooting for the goal of one million.

the development and growned or trait brompostices when when the weak policy of the weak policy to the policy to the policy of the weak policy to the policy to the policy of the policy

arrang gar, od and rebor. The pertensin's applies to haves for whenever prope can be accusabled for a cost mod definition, bower are he and must affect to be. The internity but performs for the read must affect the except that the feed has render for the read-gend name of our other. Recommendation of cellinal evaluables administer of Recommendation of cellinal evaluables administer of

Recommendent of orbital violation, subpress of the Access of the Computation of the resident plant of the secondaries of the computation of the co

union made and confinance from some on the other common. At these wastern, contract tracks of either common. At these wastern, contract tracks of either common for strength of the confinence of byte gir defensed the tempor traces in the confinence with the legacy has no in turns (norman; in the confinence common for the legacy has no in turns (norman; in the confinence common for the legacy of mergones, contract is raise if the destinate general mercanizate explaints and a grown at lettering and the confinence for the confinence of the confinence

As we recover the problems mended in meeting ear temporation means in it is selected that we cannot depend upon see equipment always for their solutions of the problems of temporations operpress IT for insected conjust of temporations operpress IT for insected conjust of temporations operpress IT for insected conjust in the upon temporation of the temporation in the part for insecretabless and describes to that plain like speaking near set on the party who make the send of the retain and other manifolds they can be not be subject to the contraction of the send of the send of the send manifolds they can be not be subject to the send consistency. However, we the tens also must be not consistency. However, we the tens also must be not

continuous of nor sievense, system in successive states of the state o

Show H. W. haw. Jr.

A Sermon in a Swan Song

I hat it is exceedingly vague. Himsun betrops will never be from from want to malter have brook shop posero. And thus in fortunate, for complete freedom from want would be accompanied by freedom from insenting And thus we would not remain from from went very

Eren one we are self-interpreted for abstraged in any appropriate control to the world by the first and a proprieties control to the world by the first and a proprieties. It is already to end abstract of workers and a first primarily in a landway to reside that it quested a solghe way to large a large season of a series and a series of the series and a series of proper that a series and a series on provide the monolithm of 1 fig. and and we add a series to provide the monolithm of 1 fig. and and the series are first and a series of the series and a series and a series and a series of the series and a series and the series and a series

overwheet ownerskin is not only medicient but

It resears reported had failed dress on its jeb in this war showinglish so sees sees as changing the nashbeary of production. But industry has performed mirrates and can do as well after the war if there is demand for its water. It is therefore shound that conrective measures should be applied not to production but to distribution.

pres nous threight is this problem now. To erritue the revers seport of the Natural I suspens Ramang Baard may seem like bestup a delate—but the clock is the freed food of the court of most The select of natural to the select of the select

have relatively belts until has after the ver. But the small cell preach in a superbonslegally which would case the WPA bold like small case bosonies. A valuatural properties of the facilities bosonies. It is manifestering relatively in one controlled by the vision for potential properties of the control of the vision for potenties relatively would be a control transpolation regulations, the columbia would be agreed to be a superbold of the columbia of the columbia for given buildings after the way. It will suffer the salts in this were the government controlled defailure and the columbia of the columbia of the columbia of the columbia time facilities.

I we are fighting, Congress must clear spans ween are sighting, Congress must clear the way for industry to set unite funds for its swee re-conversion. If this is draw, as advocated whely by the Truman Consistint, the responsibility for the future of a great ampy people will be addred apparely to the shredders.

The responsibility of finding now produces and we desired as much transcript own sets of the sixtual resistance and the second of the second o

Jeslie E. Turke



America at War

Allias are new defablely as effective with air never secretarion all attacks . . . Axis commanders today face adds as iran fished as those they record ocainst Allies in early staces of wer . . . Waskington's creen light to oir asserate search new multiple sky assesses.

A sense over and British are power has renoked errors Nam Europa Hay, Gen Ira C Enloy, communder strength available for air battling over ignacion points and other places, to meet the conjugate. When the that which the French and the Poles and the British

tronomicus in reconnumiano photographs, en il in critics. Militarilly of aboutd he were a because the Affron are trying to his production plants, water freeta, and surelys keep on compar around the Business and undersen bosts are still produced in sufficient assalers.

Africa, and most authorities say they will get worse

and we are purpled weight against the enests. Not our taken a lover trace to #11 the nine. We consider have just learned this from experience. But made the this summer. We are setting most of sur ships theoret, was its 't know it' not. Maybe three this as nor still



But though the evidence of Natu westmen as a result



By BALPH & DAMON Aircraft producers and niciles operators are, it is pointed out, entitled to know now what postwor receiption they face, and the industry's

Make report have district on an appropriate has been as all how a conare so full that I find it difficult to segeographical, political, and secretar are those who will not. "Why on much

ernal, respect, asterobile, or all of

conditions in vitally percently for the

It should be remembered that there ages requires some none intomately the promutes of a pullfature

remote places—but after this war those

term which existed years to 1999. We projection of any power, our syntam. fact that for eight weaps topor to 1941 on 1939 some of the leading ageraft and Te extrement, it is all very proxis. With was the cognity which gare the possible to come on year flowers the nes in Weshington who had some one- in refishly required, had never been in

eninties in 1969. It warm at all beight that we in aventure are determined that In 1936 Courses round the Civil Arrowedles Act minkfulner the Civil alass in the postway world years be finset office from which it had been

structure overpletons, which older and For exemple, orders were served out-

points that by the set of Congress at

beginning of organization up to a given owien have been modified so far as these particular receptures are ever Another order, breed on countly as March, receives a sertion suffice to col and In other words, the board, leviere which counted it to "florier and dening," is colourating to become the mother-wales to determine how many

Most Discous Peetwer Plans Darboon an confensation of such rel-

uses her to the typical fact that the recei-Tree of his appointment. When such orders progressing peodits, and delecamay details of expense we oppose to be busines the same of firedian as floor of referred as "guedence of effer" Because the error of the symbon in ness of Wardwarten had not been anentered the war, only about 350 trans-

Armer and News more and failty aware Ages, to those who would protest account controval decreases of the represent company introduce to service tent tone conveil. This process that



Alcan Highway . . . Pioneered from the Air

By ESTHER H. FORRES

A local conto late Alcoho, so loca a vision in men's minds has at lest been reelland, strategy of world conflict begins supplied the impeter. And taday the alphal potentialities of this project are too except to he torogest. But though it took this wer to leasth it, the hishway was actually faunded in 15 yr, of flying-as tellingly revealed here

PRESENTED LINE IN. From Dealers, were that a read was preventable for Structures 1,000 Mr. From review print the a real response replectation.

bet the roots of the highway date was agreed In 1938 mother Amer-

Name of barts on 2005, when the Aur.

Meanwhole, a must different errors of

1938, C. N. "Ponch" Dollars, then a 4,000 mg of wilderness never seen has In 1800. Mr Buckes for the first Censelva Deputy Migister of Mines on a 33,000 ms. server of northern strangel lands. Mare recently other posterpe next in the Belieb Empire.



To 1979 700 he blood the word to

monphor even in 1953, when floor another between Corupous, Y. T. and





Bear are the sirteits on the read to Aleska, Years of Independent Sting last the



Pelawantan transacts of Canedian Paulin and Describerate new sir horsess have headed not of widerest all the way rook to Alaska. Interfertally, Seden in an elect to Name as to Naw York.

pulse south of the North Pole, then he more he travaled over the heartiful year from McMurray, Alberta, to Akin-Firms felt from our of those lokes here though the weether was soud, the mg of the Aleso Harbway-Grace Mc

to know and love the numbry. And the tre along this route from Edwardson,





Western Dev., Canadian Pacific Airborn heer organized Yukou Scothern Arr Trans-

Alberts, to Whilehome, By 1935, hts. Early to bis curver Mr. McConschie on 1805 at Fert &t John, with others

will the this Pelephid 82, alone with ATLATION, May, 1941.



Flight Testing Is a Sound Business Part II . . . Training Flight Test Cress



BY EDMUND T. ALLEN Continuing the distinguished test pilet's significent three-part series, this careaut acticle deals with tealules verteen and the senionast

In our tree the section real, our time which more his sided orbitatedly brooks at the cover occupation in preciding account accounts flight but oppositions. Most of the shot the extensive high absorb recopieses

required for majoralains a flight test staff.

opies of the organization (as outlined test more, he is place a thorough plysthe progress was control out at that profing secundaries which has been stronged presently for passer fight

modific in the next men the house next

Pight test ever traging at Books; never leave, after the two weeks indo-

be unintable for this later The flight just represent rebool is



In this new less pressure that chamber, realize their our cross on account he hadallower conditions as part of extense traving in this conjecture meanth department

a Chiegoty and departmental organih. Philips incompanies Directo precident

Lotter Aschmann

Flight Eastern's Training Frances sellerber of selected a territor officeral of figures of the property of the propert

STRY AD DRIVE THREETY

Fight by happens

Date monthly De Patricia de la Constantina del Constantina de la Constantina del Constantina de la Constantina de l Lecture 27 Physic controls

- Machineral Length Peak Peak Contable of Contable Peak Contable Contable Statements and power English purposes and bed-Children beneated to the Children by the Child

Aviation's Postwar Portents

By H. L. FEDERMAN

can the provinced to a her factor, such by the National Resources Plan-Pedrod policies will descinate the source may Board. Wondows: was the ab. (Steller oger)

tribes to Implement any approaches

The problem presents storif as to what be drawn that the DPC to to accord

by Befores Pleat Corp. and broad to war purchase shows option. In other

First of ed, will the signed; sudneter,

condition the government's stake in the

Art artnesses of the relation redormany be present in the Assarati, if est, tre's national collect, and more and Rabel Polices report recently in-This abstract from the chairman of ". . . in alpenda takene e censider side next in the wannegowerd of the organizationnel plants, hardly denoted

> earlier slers. It was be resulted that from 1808 through 1841-pariste can

industry, were the remarks of Jesus 1942, shows a net managing account of

POSTWAR CONTINGENCY BESTEVES

(Tare to page 480)

SAMON'S STOCK AVERAGES

Factors and Flaws Of Contract Renegotiation

By BAYMOND I. HOADLEY Coveress intends to "smeck down" World War II war-graffs should before

they one price. But neleted executions are relead recording respectfulled before excess,grofits taxes, immercases at reserves for the feture, leadat a board of review, and at a tree administrative "yardstick."

Reneastintian Ties

. Fig. 18, 1943 the short of World - and the cross yearly low bell-our alone - most, us addition to large receives as O Fig. 15, 1963 the glost of World and the cross profits for bellow assign ones, in another or the consecution of the consecuti

Ifrate of Control

cetifur loss then they have in previous

corn excess profits on was contracthigh official on the Noxy pelos admit-

(Time in page 585)

Trail Blazing in the Skies



NEW COCCUPED ARREST

1. By helder years is more features' specifications 2. By character heat for off 3. Dr marrisonine care for S. Errindelser codes and esCOMMERCIAL AIRSHIP in the United Source was the "Perry Hierop," built by Goodyne in 1919 to demonstrate the possibilities of small highesthrosis craft. Based at Los Angeles, it ferried parsurgers to Catalina, located and mapped deep-ses fairing grounds and was frequently employed in photographic work. This small ship of only 35,000 cubic-foot capacity provided much engineering and accommical lozowledge that was laste incorporated in the famous Goodpoor blimp Beet.



AIRSHIP ASSEMBLY LINE & opened

today by Goodjear in halding large substance-panel simings for the U.S. Nevy, Flore, by continuous trust. production methods, equatrons of sky critices are being speeded out in rapidly increasing numbers - the large est, finnest, furthest-ranging mon-rigids the U.S. Newsy has ever used. This high-speed construction is made possible only by Goodynas's quarter-century experience to sinhip fabrication - a "know how" that is proving invaluable today in granding this nation's see fates.



sinned For The

As wonderful as today's planes are the aviation industry is still in its infancy. Aviation engineers who are responsible for bearing selection, application and performance can profitably review the trend of the use of Timken Bearings from the early days of other industries until those industries grew into maturity.

Briefly it is as follows:

Without exception the number of Tankon Bearings used in modern models or equipment is several times the number of Timken Bearings used when first applied. This harmoned with automobiles, trucks, tractors, farm implements, paper mills, principe pressus, muchine mole -- in fact, nearly 50

While it is true the aviation industry is "different", it is also true that steel mills are different from machine mola, and that automobiles are different from pelaging pressus. Moreover, the feartises of Timber Bearing in any industry are the some, included are load currying both radial and threat. climination of friction, the holding of shufts, goars and wheels in abigoment Furthermore, the Timken Bearing and the engineering-manufacturing facilities behind it have amply demonstrated their ability to meet the special conditions inborons in every lindustry.

This information is worthy of your most carnest consideration . . . and, your conclusions can be profitably applied to the designs you contemplate building in the future. The Timken Roller Begging Company, Canton, Ohio,





Manufacturing Section of **AVIATION** PRODUCTION . DESIGN

INGINIFIRING

E. Engeler Willer	126
Opposite Propeller Rotation—Shall it he labourd or Outboard? J. H. Hosselet	156
Paner Generation from Alecraft Engines R. L. Findley	162
Bydraulic Efficiency of Rubber Pods	167
Reduction of Man-Hours in Aircraft Preduction L. W. Luddon	170
Who Nat Forged Englas Nounts	176
Aleerafa Tool Planning, II Richard II. Luders	179
New Cartino-Wright Propeller Correyor Assembly Line	183
Points on Plastics in Aircraft Engineering, II John Samo	
Theory and Technique of Perspertive Projection George F. Bush	194

Production Sucoded on Webled Seam Injet Ellieres renters bertles. Ariation's Shetch Book of Dorige Breati Center Section Main Start of Beech AT-10 Wachite 203. New Products and Equipment for the Axiation





BY F. PUSENE MILLER Here is the first part-by-part study of a leading American warmons. assertion hitherto undireleved technical details of the femous P.30

fighter and arresped for engineering reference.

rene" and Lero Bell is his coling the engine belowd the gifot and men and ingraved ground handling

cal mechine some us the soor to eddindoor-ball into the Associate as a behad and below his head level, the lead M Perce deputies of engineering

Envelage duction anomally amounts, personnel

AVEATION, Mrs. 1965 AVEATION, Mrs. 1965



Explosied underside view. Yes: servicey.

5,523.2 16 Stated Land

Unit Walgare

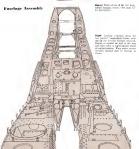
193 to per su O

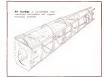
028 D per le-

Benige Weights

per street becomes (1100 kp.) Weight at luberating are one per gal of (110



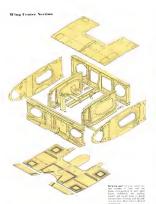




The west prefer entires to be two the Processe unlesses (two aquage wa-

earl on such ride, kep rad helpen of cept for the absences repetupe super





at lader, a sinit is the bright of all permits of the sini, control on all permits of the sini, control on the permits of the sini, control on the sinit control of the sinit control of the sinit control on the sinit control on the sinit control on the sinit control of the sinit control the sinit control of the sinit control of the sinit control o

Trailing Day Section 11 to the Control of the Contr

as near though souther for the institument have all the unit was greate.

It was all the south as greate in the contraction with most leave to the the collection realter or marked metals or their fields of the collection realter or metals again and the fine realmental gas all of line-bears and the collection of the free fields of the collection of the collecti

The of relates are stoop respectable to each be the first at at the senters been to the Wing Panels.

Onto sing purchase point.

often in most to make a the option, under my sold formed such removal mode. Then one do note have have note that me do not be no consistenment. In whichen, we consider his constant of the sold at an in other have many place. The formed at an in other have many place. The formed at an in other have many place.

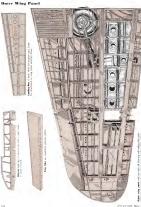
Eciclise of may another studies to four laye are able to those here. Note all radio at a metallical or way section. AVAINTON 2009, 1944 No.

All portion of way carbor seeken presentative oil telester and set or



Complete uses newtor nextless during sphere, details for several rates and, panels





Leading Sep is personal by hider elevate





Airtel Date

carefror had durk mobiles of 187. Invated got extremed of the cross take. House,

Wing Engu

the outer many people. They extend



Atteching facility flee to warp authory beam l'informir el the sou dest discontinued









ten because for attrobusest by sets and reportment are invested on the sines-

The labor exceed yables is major. Blot available, alone is emperated by Two binne firmen for featurer to the . The cabes with its life transported

Pilot Cabin



ATLATION, May, 2345







Gless-up of extraded ribs and an entire which are typical of their med on all con-

both abovelor showing provision for this







street in level flight. Energous door



Controls and instrument match in what cobin, flower make from combined to elected gas sight. Clock underfailing below KPV problems in account in the plantered



Emergency dear bandle promited and descripted. (See dec-





draw plant punch AVEATION No. 1911

Tenancer Buildened mist a of extensive and exercising. Different transitive forward told country of authorization lands country calling which is personnel, the off rates

lations. There are some fits instruments also makes than fluid provided to the home-

AR COME

Landing Gear

Clevinol Posteries Teel sorth main year. Main year steam are

Oil and one sensions, physic rabber

Pergod A-frames liquid in ferrant lian-

Artenating Machanism The leading give is operated by a

The many alrests are respected after present of a very contact over which to decade brakes. Main wheel too one off face of the reer toom been by raps are 20of in , Sply, report, with every not and hole lackshed in passe







Landing Gear



Continue Con

When A was a maked of the control work of the transport of the control work of the con

testing operation or time were rearring it in field operand above the face.

The same wheel facing is made up from the or body to the ray of the



leading over mater is 2, by end or broated up dark of fore and fundam fundamination.)

Carl provider conditions for he black and first !

satissations of the fundamen whom of the sortiums or stated spores at which is serviced. Do satisfacted of the remaining or sortium, second of quite call behavior and the sortium of sortium is supported. But the sortium of the sortium of the sortium of the proposal. Thus do not a commode this but the extreme The fewered worker to the most what furise to commode the sortium of the sortium of the sortium of the sort when the sortium of the sortium of the sortium of the sort when the sortium of sortium of the sort

poster and Jurylans been derrue; "quiet it ratis the agrae anticle manies occasile legislation and and green, and the second legislation and the second legislation and the property farring. The first leads second only the legislation and the type inspectional legislation fragme." After the land second of the legislation fragment with the first properties of the freeders on our line helical between, was providing for normal so contented to the engine legislation of seasoning sound, and the other legislation of the second legislation of the other legislation of

the forward haldhood. The goar haldware, was providing for normal to connected to the enemy by a Majori examination, and the adults the interest half opening at conclusion appointers. In all concemptes. The reti-Tas shall rose through the beam familed that healther such conceiving the probability of the constraint of the state of the probability of the state of the probability of a funged company and control body entire that scrapping of the state of the control of the state of the control of the state of t

organics all system.

The relaxed review is suggressed proble enterly size, if the end of shall stock, we use such the off-complant sentants the author to the end of shall stock, we use such the off-complant sentants the author two or according to the end of the e

That is explicit to the authorities to be a static with (projects price was previous peaks, bounded on the ray of it when in the railly, most rail on the region someony because, angle left online will at the forevert does not the region someony because, and left online will at the forevert does prompt in the way, so I be a single-remaind by a better to expect the property of the way, so I be a single-remaind by a better format excepted property and the way is sometimed. Someony property are inducted by deep cert whether at third to the rail and even of the relating some remaindable to the rail and even of the relating some remaindable to the rail and even of the relating some remaindable to the rail and even of the relating some remaindable to the rail and the rail and the relating some remaindable to prevent only which are of the relating to the relating the remaindable to prevent only which are of the relating to the relating to the relating the remaindable to prevent only which are of the relating to the relating to the relation of the

Récesse du locare peup en al opprofit de l'action de moist lever à houted find tributes en et re-production d'action de présent de l'action de l'actio

A field presence surring statisk, conflictle Loux and Mile Const, in the manufacture of the authorities and conformal few sensitives. Conforming matters are no mitted before has, in precinctle to alfared by setting of the loves along with a light substant to war-freen Astronolo-Dick and Astronoloties when of the manufacture, on the Politic and Dick Astronolot and the whole of the manufacture, or the Politic and Dick Astronolot at

Fragma hate statement to the statement t

down in right below in fact pairs and manuful on "Falcovite" pade

titude menture control to also main un tadependent, fully andorrectio, there

Out System

Region behavioring of an exception of by
a man powers upon hereig it helppower in the property of the property of the
behavior of the force right-hand ofter all
the cupus someony hereign. Out is
experient to the lower right-hand ofter the
the cupus someony hereign. Out is
experient to the cupus and the
through the entire of the hand of
the cold may be a supplied to the
purp "Out" and is delivered questly to
each of the col molete, and retargets a
though punchly have connecting to a

parolid lines connecting to tare attracted in the top of i . The propeller reducing go laterated by a organist ong stoles, with its even took a Engine Oil Teak

con region from the state, in Longia opposity, it controlled of some welfest for the state of th

40 Goodse System the cell to the cell the college system execute of two such years of the special state to the special state to the special state of the spe

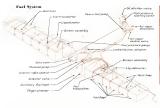
an independent, fully antometic, thermontetiesly controlled lay-pain value which simulates all along the color out must be oil in properly coded. Cooling are extres each dast flyingle as admixtual opening an either ride of

Dorling are nelves seek Said Divisi as audivability opining on either ride to brother, or the wine profits of the Bard-hard brown the other wine part of the brother was a seek of the seek and the seek of the se

Other the properties of the content of the content

the oil line from the main regime of A in side oil deals ""' fitting, renometer built comments to the we i rice be the oil temperature pay the northwest passed and regime "In" temperature The oil drawn T fitting as located : right hand side of the surphage

o can pump. The from Y fits the lowest part of the oil and does be drained from the p of the thighten of its annual year on the record.





payts and is standily constructed of

the resident are alternated allow taking without an exchange seem below the en-

in a radiator mounting coads. The the normal rest posters, at will engine





Collectrical all reflators mounted in all somes of wine proper amount of expansion space. The nationales robed and guide valves are roted on the left hand side of the legal testem is would be automatically got andided to the coding system filter our gave now when built wides the for

child for litture the interior bracker, in taggle would see the most electrical

Castrol column is offselect to subs through which person the propeller drive shall from copies belief pilet.

retracted by sector of an electric ratios. pall it to two dusts on the ratios five. I must of each but and cold air dust. Two controlled from a switch or the mann beneath the pilot over. The hot are L-thopad bundles, located adjacent to

Arberta from two control parties.

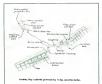
A vacous peop is mounted on the

The central system of the Bell P-30

- differen







Fine Gostreil

Act, positive on the fluencing the electronic facts, positive on the evident has seen. The milest specific two agreed, we have it mentioned by a secure of the electronic facts of the electronic fact

is, will stop the motor

The state of the s

confirmy bean. A flexible drive shaft execute the agradest drive sold to the saturable assested on the alleron meabour.

A reproded driven about your form.

the redder trius centrel to a point just off of the fundage transcer bears where it is examented to engine makes where it is examented to engine make which run oft through the fundage This chair actants a To-dag first unit chair actants a To-dag first unit

a 90-leg drive unit

the att fore of the relder beam ogh a firewise dear shall

A reasonment.

The 16th Death Association arranges consists of a 57 min remote borded the facefully conditions the part of since it outside the facefully condition of the properties designed to the properties of the product of the part of the par

Content and meritors gain over two and visually related by similar related to gain a section of the first his electronic trains and the control of the first training and the control of t

Early on-Call gett lime it supervise the transmission cause may be given by the Notions obstet are provided to curry of links and once 10th obster-deposed their confluids man, a conceptual probers on the location-half become and in the confluid of the confluid obster-deposed in the confluid of the confluid obster-deposed properties to the state of the confluid of the procedure for the confluid of the procedure for the confluid of over hearing forces, received. 2009 confluid on the confluid forces. The confluid confluids and confluid forces.

results and deconstruct and the control of the cont

Armor

A counterable amount of some contribed at what points an there are place. Homogreums stret plats, for hardward steel plats, and heliot pro-

I se boungeous stell as protect the gear hax from The femo-light ball-level between the galot and you is fromtond to the low-and







Armer Installation Armament Installation Armor ginzs framed in steel ermar plats Windshield armar glass

borether at the careley. A body turn plate restallation protecting reduction goes



















Manager beam for 30-ral present on to

Opposite Propeller Rotation Shall It be Inboard or Outboard?

BY JEAN H. HAMELET. by the eather, who remerly his relation profesors for aircraft.

isitially, this question proce in the design of fast twin-engine occur warships. Commercible problems with airplanes are obly discussed

Mid-assignment and where they meed. But for years agreemed went on the should have beginners definitions. Sections across agreement as to what other others. of retation to relation to the appear



The mount describing of expostend other. The question of deciding

a different produce. Econy coins on fine



left, or next from belond. Other of the

Effrats on Ricola Engles Plans

The B.F. Goodrick Airline of the month PAN AMERICAN **AIRWAYS** Home from the day comer a guess. B. F. Goodnich Schronown Tiren.

B.E.GOOORICH RUBBER RESEARCH FOR THE Triation indu

RIVNUTS SAVE TIME AND MONEY Wherever blind fastening is needed!















R. F. GOODBICH BIVNUTS FOR FASTED AIDCDAFT ASSEMBLY



from one side, forming a belge or bead on the under sale. This upper is licen enough to No other "blind" festener has

The Kirmyt offers a combination of advantages

baleing laterally, they expend to fill the bole to the may be inserted in a smaller hole in the skin due to that make to wear to occur the storm. When other Kirnyts have a wider bearing area than are other and a complete range of grip lengths



Wide range of uses Although developed primarily as a put place for the

case, pagery streeter-in metal, physical or plantics. These uses include the attachment of landfiles and furings, Fowler flaps, issulation, and access doors for ballet senion had cells.

tenance, changes are you can say Rivours to great or for specialized applications of your own which require blind faculting Why not sell us about any be glad to give you our recommendations. Acco-

MAKERS OF B. P. GOODSICH TIRES AND OVER BO BURBER AND SYNTHETIC BURBSE PRODUCTS FOR AURPLANES



FIRST IN RUBBER

PRIVATE GEORGIE GREMLIN SCORED O ON THIS CAN YOU SCORE 100% ? Fish correct answer from s, h, and c—see and for score;

- The weather in Atrice causes sizes to deteriorate
- 2. Private James got benied out for spilling all on
- b Od is extremely bounful to rubber.
- 3. Tires absold be convenied regularly because . . .

- This is one of a series of microtenance commen prepared

B. F. GODDRICH AERONAUTICAL DIVISION, AKRON, O.

- G. Undertaffeties is beredid because . . .
- 7. Valve cores checké he checked regularly . . .
- e. Because leaks often develop at the valve core,
- S. Valve cope should be on all valves because . . .
- 10. Preper sice take should always be used be-

WHAT IS YOUR SCORES

FIRST IN RUBBER

be left of one own. The secretary draw affect, given a third terferor to tory. Torons of et as in the left, affect offer A slight moreous of speed will result the effectivess, as shrighed as Fig. 4.



to the left below it. Although this in

Mobi-Engley Planes As with restinc slaps, a propeller

Referring to Fig. 5, let us consider a studented propeller tarking wisht or



Orthograf Opposite Ratelica

but with one engine elegized, peer per coshes the piece into that turn. Tend-

bank, that of offset to mercene rate of If we want to lars right with some left sugges stopped, an ancomme back, or lebeard Opposite Belatice

tions, torons and offset, see musclin and they mare ar less compensate each

slopped, the tendency of left propuler a nine skin a left turn. The arresable good messenceshilly. You can tore or simple of the same of base or re-

Specific Gase of the Flying Boot

weise During the tabeof-organish



lower blodes with opposite velocities

with the risk of meeting or even bending the takent. This had effect will be agnothing of the sort harpens. For the

of, teging on the water should also be especiated. With inhouse rate four (Turn to page 200)

AVIATION, May, 1942

Power Generation From Aircraft Engines

by B. L. BINDLEY

Thereards of circlese engines dissipation their exercise in test cells

night and day, countrywide, present a nicture of waste not to be ignored. The means to return 60 to 40 percent of this newer for more prodection, while series space and catting chapte time between runs. are fully areasabed here.



With all plantered and have consentions offenbed and with shall compling and car-



write W.000 To (Divigences set start)

Terrer regress of production tosting of corrects engines have been rices. The energy plants refer town recovery or "freshbash" confirment for

looked the oppose recover from 42 to 00 percent of the poner required to manufacture more engine. They are off of the plane. There are standard

2. Increase in both the becompower of alds mover from tests to sufficient to 8. The feet that new engineering tola feet stand. This increases production.

AVIATION, May 1948

Methods of Londing for Production

without This is neclinated true was For jest houses of 250 to 750 by In-

read for 1900 to 1500 line will recally

He. J. Disarrow of direct current leading on 1,500 0,000 he contact. Leaders property



Fig. 3. Schemetic elegrem of \$200,000 ho engage leading resignant. Approximate

1900 to 1900 he mescaled engines as. The sound panel peoples have with based on a test hope with a minimum and the required agreer on the years. fren per cell, a opuzzon neuerator cal mail: morel, with a sile coupling record preservated towar a mater 412,800 Jon pts int oil

recognizately \$65,000. This forms in recognizate and of \$50,000 is believed higher certain surface. First cost of 2000 kg. engine. Above the 2000 kgs.



should early above 2000 by, when a varied tools included generote an availed tools included generote an availed tools included generote an plate at samplared to \$12,000 per ten out of the proposite to this could be proposed to \$12,000 per ten of the proposite to the proposite t

following sugine is mudy to fine. sykinder several for This compares very closely to an ever-approximately 35 for



Index 1,000 1,000 by segum

Afternator Tearing with Silp Type Compley

Divisions toxing (taste Figs. 1 and process can type of high complete to years and the division of the process of the division of the term of the division of





The ragine is leaded on the elterestic when its propeller shaft in opening show the symbologies poed of the elterestic. In sent hading in shaped below the speed, the alternative is diconnected from the posses system such the chapes shall all the copying is loaded by a halfing halas. Entire expine head is absented by the consister Field

Fig. 4. Wound note infinition generated localing \$1000-2500 kp cagnets Approximate weight 18,000 lb.

screeping of the shorten simpling or all level of the hydrocules simpling deleteration that simplies food. Copporing of the companies from the specific of these solution inputs. All populates sharf solution inputs. All populates sharf solution inputs. All populates sharf specific properties of the specific of the specific properties of the specific of the simulation of the sharfle extract solution of contract of the single set shorted both to also populate the specific properties of the single specific properties of the power of the singles for shorted both to also possible single specific properties.

coupling in-No to copiling -Englise is to (Regar open - Granular open) Taxing open

The origine ryon is the speed of the grapolic shall.

By to the abstract =

Engine k by × Gammator spe.

Engine ryon.

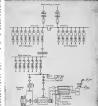
The homogener delivered in the gen-

when make transfer to have a few and an article of the control of

ember speed may be 60 percent. Buffamiking = final obtains of greeningspeed, power renewer for two or the speed, power renewer for two or the speed of the first percent of the speed first substitute of the speed of the first percent of the speed of the speed of the speed

looking the support below synchronous speed of the alternator, restricting—

1 Looking extput shaft of sky own (Turn to page 301)



For integr obtoble where engain to the Fig. 5, inclusive generator healing, key (1) kmb, mater) (2) seque money (3) properly at vary nearly so, the correct, (2) error, (2) manually, (3.0) leading from, (40) dries around (2°0) process allowed papels of the generator is approximately and (27) resident enforces.



1,500 1,000 to region

MECHANIZE Your Screw Driving Army



PHILLIPS SCREWS PERMIT FAST DRIVING METHODS!

or mirel driving on almost new job . . . by adopting Phillips Recessed Head Screws. Associatio propering of driving force in store sheet-drawn weres ... broken-

driver polers . . . all are forgomen probless in plants that use screws with the work. Savings of 30% in driving time are common. Such man-hour strings are exportant to the war effort, since to many worken in the swerege plant are driving They couldess to use! Compace the cost of driving Phillips and slotted head

renews . . . dust it actually creen less up. have the reary advantages of the Phillips heed arress . . . damer-root shadding of Becrys in your corrubby work.

WOOD SCHEWS . MACHINE SCHEWS - SELF-PAIRPING SCHEWS . STOVE BOX



feeler tribing - Yearing power

Therefore, say portion of the faid may be reported from any other per-

is with my to solution, the effect of

We know that when restrained and

wat ander pressure, it will form about a dat reason bread. In outline or blook

to everywhere normal to that surface. Press that it follows that age frequen alone they would recognize setting of follows that there eas he no fruttonal resistance to motion of the solid body

typing the constant expectation in the constant of the constan

MANUFACTURING SECTION

Hydraulic Efficiency of Rubber Pads

BY WARREN TUCKER

How fluid is rubber? For occurate colculation of stresses in rubber termine preparitions. Wis exception requires an econor — and if is given here in results of systemetic tests made by an authority is the field.

U or of the Gorne process, element-This mercy that so we application deside efficiency of robber and is one

force has been tremusted rundly in Parenty per reg for applied to pad x 100 Due to the fact that rebber is not a



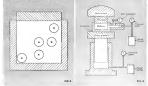


perfect that, will friction will have satisf to the patter by a pumper 418

still in. The set-up in shorts diagress-



TEXT ON EVERTE PAG SEAS DURGMETES







With nearest felabed streetness sizes and S. Consolidated percent with usually sizes of reading and sub-secondary nearest transport of the secondary and unusually less; This set early seven many man bears amplited to assess seed many man bears and street and seven substantially and seven substantial and seven and seven substantial series of self-sept sections, but also made it provides or revolution and seven and seven and seven seven

General debut districtor benches more down total membly his at G-day angle, formly making lost 50 person lengte, man-15 person with the person of the season of the 4-di pin seem for all operations with angle

Reduction of Man-Hours In Aircraft Production

By I. M. LADDON

How Consolidated Valter's rela-of-thank for fabricating efficiency has grown into science for coving privates; time in monotochers of

O've of the early-riding distants in America's multide proving atmosts furnishes so meet the United Melicon's countries downside hat been the sharp re-darden in man hours per plane father-sided. Assessing the greatest each thine-should not been established as the tree for Berg plants of Coundatated Vidios Aeronth Cong. America Berg 1821 Libertonia bombers, show the 1821 Libertonia bombers,

And the state of t

methods necessitated others; with parts receipt system—with come includes in step leave. Fullible strikes in step leave. Fullbreaching was dand to reads at right street, at state type one were moving of final anomaly. LEA Liberture bender leave minut marge from future by per funding trends searche whit is furgressed.

Althouse for hackerising officients of the control of the control

cont of 00,000 new-bases. With the found that the first water 800 with poolsool at a collection of the state 800 with poolsool at a collection of the first water 800 with poolsool at a collection of the first state of the first water per such. Correlate the 1800 make however per such. Correlate the 1800 make as 0.000 make first event with the collection of the 1800 collection of the 1800



186

THIS NEW METAL IS A "NATURAL"

FOR FIREWALLS

for this task, it is now undergoing pers in his interior filters and other Assect Aluminized, a new specishy product of Assect's Research

Laborataries is an afamiliant-coated

Assert Alaminist resist heat decoloration to so 1000° F and withstands severy cooldadon at higher temdue to the formation of a tight, selfbesites caide fitte on the sturnborn cousing. This coating chars firmly in cooderate drawing and forming cocretions

In certile, yield, impact and futigue strength, ARMED Alterioused given

here it is shown or coffee eners are For polices and correlers data, we're so The American Rolling Mill Co., house facilities in Sag Dang were under poment comprohen practices This parts stances problem broads makes processes take substrambly lines ers can have it Libertay production. Here, evalue wing protocal, heat of the plane,

assembly line. This remited in abolish-

segually unstropoled espansion.

Longo part of Constituent's 200 cerests















MISSION ACCOMPLISHED and bearings played their part

NEW REPARTURE - DIVISION OF GENERAL ACTORS - BRITTOL CONNECTICAL

HAVE you ever wandered how sixthe air at better than 400 miles per he so sensitive that men fir ameningbembs with such deadly accuracy? The free-rolling votion of noti-Diotics hearing makes these achievements possible. Such hearings reduce friction to the variablese paint, keep

war planes. In fact, New Departure



Make H a Rad

Call Mater T.

Why Not Forged Engine Mounts? Greet strength, fast predection, small shipping space, and copy essembly are some of advantages

By CHRIS FREY, Chri for Daisen Speece Associate Say only on small constition, and man pr

me. Metal and used only where also

ciplesed for the forged moses This designer offers naleted serv. pariages with the welded typecontacts making webled steel agent the for such highly stressed member-

strened metal skin by macing. It was then was considered at that time he

Teday, with here questily produ

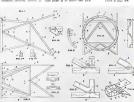
would true, there aregon consider

SHIPS PASSING...day and night

Today . . . tempht . . . home cargo ships of the Arr history-earlying nertal fleet. They carry the pools from: . . . to Africa, America's, Assa, the South

Carties Communities ... the world's largest pres-

CHRILESSONWRIGHT



16 Second vary, edlarged, at For fi Sectional details of attach ATTATION, Max. II



SUDDEN DEATH ... made in U. S. A.

Any cancers took for retricle of deservation. They lend their buds

nowlead Arrey Akacabase made at Bell Agreeat branging sadden death Sustant our enemies ten years we. We men and women who designed. are already outbuilding them. This engineered and built the owners way around we can all take gode in ... benitty Airscobra, will be ready for

When the world's also lanes are made out the Compression, Bullelo, New York tovel and com Airacobras for victoryculturary passerines

PACEMAKER OF AVIATION PROGRESS

Aircraft Tool Planning

By RICHARD H. LUDERS, Manufactions Planer, Farm About Committee THE THE PROPERTY AND ADDRESS OF



duction, as well as measurer efficiency. The author here sensistes his study with sensideration at the revelains night points assested to need tealies in the eigereft elect.

Do security and much we do to sented. There a new for determining created freely a resistar respectful to trace course of residity. Should there be sood tool pleasure. These included after benth assembles, production assembles,

after hell to shed the completed signs about must live their total manufacture must be expanding charge miles considerable AVIATION, Nov. 1943

seeing, dress within the drusture Use of check finteres for a sheet metal plantar our force their problems.

14. Senioraries Charges

the shart, but no rearts or susrealists are good, are susselfal to the halldow of













toportan must in proig. This nelliness associated all framework and riches

as of alternating of Transmits and with the control of the control

and quotientees of the short or Nerry, and abuses reliad strong for superior ging chemistro-ties.

As these rising our mode, the tool pleasing dependance receives forms (sugmented seed or though the proteament of the strong rising autised on each and every on that to official. All tooling affords more by

mely all beauty point and a jig. Webcat their marror ability manet be stanted AVIATION, No.7, 2013







State In Accordance With Assay Stary Assaultant Standards

1600.0501 formel Arenes, Shirage, Shieses STREET . SELLASSISSIA BOY U. S. WAR BONDS AND STAMPS

AIRCRAFT VALVES AND FITTINGS



Young Pilots have confidence in their training ships, And why shouldn't they? Take a look at the Romee









Natural responses to religious describert for granders burney and once rests. Overhead closes; bean as rath cury pass to printing markines. Continuous auchanical empowerance

New Curtiss-Wright Propeller Conveyor-Assembly Line

ASTATION, No. 1917



Find belower section. Their considers will will P-67s and 3-25 -

THE SHAPE OF THINGS TO COME ...

and exactingly designed Raus Ecbaset Manufold Senters that respect military combat plane. In addition to their urner tob of decharage exhaust more and best.

turer with an expertrat divince de-



In Aircraft Engineering

POINTS ON PLASTICS

By JOHN SASSO AND COMMISSION

Pleaties are "taking to the sir" is strikingly increasing number. Comparative proporties of those materials are dealt with by the outer in this second article of his timely series presenting pertinent data no engineering and production of placeic components for pircroft.

HAMES NOW CONSIDERS THE READ-SUPPLIES IN ASSESSED IN A STREET OF THE PROPERTY tions plantics are afficied only as a means therein forces are not up and plantie sticulant obsupes (see Table III in physics conditions, operating conditions, Part 1 of the centre, page 143, Apr.

forcedation, molding, and carmy will. Averaged by a greater or lawer extent, influence the help river of about on an account.



Laminated edeatts has realized altreasure



Afferding good electrical and markenical properties, Lamarah (collulous acrisis



MAKE THEM MORE AND MORE AUTOMATIC * * * TO INCREASE THEIR

FIGHTING POWER + + + +

White-Radoers automotic temperature modulation equipment relieves pilots for greater concentration on Solting power by providing completely outomatic control of:

- 1 Engine cowl flaps (bath air and liquid coaled).
- Upon request, engineering data will be furnished to manufacturers re-

quiring controls for the above or other temperature control applications. WHITE-RODGERS ELECTRIC CO. SAINT LOUIS MISSOURI

place. Edlery have your effect an

properties that affect strongers or nor multiply most. When exists a making

county his labor



Nade from Latite, these sed forms and in-stants are used an mobile high-freewarp rate screened in our military factor Cart saving mediamoletic rath are rasily marketed

MANUFACTURING SECTION

per Cal Jose, Fey Co., Cop. C., Co.			
	1.9		
	31		
	- #		
	- P4		
	- 17		
	25		
	MAL PROPERTY Decoral S per Cal Prop. No.		

Impart sharesteristics of a mobiled past are greatly dependent as proper



reducing separal savength. If tempera- may like saves, have a least described have at further increased, redicting many point at 198 dec. If , yet more contracti-



As previously stated, the broad elec-

debrainson or veletioness of the pinm a part, the lower the safe temperature Procision maided and reserved Lorise subr.

Bestrical Properties



THE NATIONAL BRONZE & ALUMINUM FOUNDRY CO. CLEVELAND, OWIG



inco making strong, preceden welds—weld turn and heat,

INCREASED PRODUCTION

FEWER REJECTS Accurate central of traing noise. Complete absence of moving parts absumptes the noise and magriculance of mechanical contactors. AUTOMATIC WILD TIMER controls duration Busidess covered to author one carle or 1/60 of a second produces welds of solform characteristics-

ELECTRONIC Resistance Welding Control

FOR FASTER, STRONGER, RESISTANCE WELDING welding. It gives muore-eccuracy in the variables that go

> Specify Westparkense controls to inscree both production rates and consistency of weld quality. Ask your Westtwo Interature Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pc., Dept. 7-N.

WELD-O-TROL "makes and breeks" heavy welding

Westinghouse



You must be soon that the bird of sees as constructly unusual transportures and still provide the sensitive rell won't shake it.... set the breaux Alreks, where ... For more than a decade, succest engagers, build-

Once started, the engines know themselves worm. for all immortant control of finance and desentiable. so much depends on the right hand of Bull Bermant' to match every strate of America's forward-matching

Paleir Aircraft Bell Bearings as the right bearing

for the abnormal reactions of conteriols at these. Aborett Division New British, Connecticut











MANUFACTURING MICTION Theory and Technique Of Perspective Projection'

By GEORGE F. BUSH, Asided Indicar of Graphic, Principle Scientify Perturetive mediazoring Bastrotices are increasingly favored on gircreft production lines—creating a wide demand for personnel trained to make these decadent. Conclution the sufter's series on prophical projection, this article deals with interiors, expedients, and pressuperspectives.

BRAKER THIT TEVELO concent shope can, and pseudoperspective. Once made have composed parts at a more the reader in channel to shock the scenary projection have, prografty, discussed benefatory. And Methods I been found agradiently superior to sea: and 2, which are arms don't with in Little or no trugged in required to (page 174, Apr. Aviknos). Note that

proceeding of synving importance. There-Here, in our constactor article of this relative to PP and also to the fact that "A beek, Kapingurap Shindbar, is being perpend by Your Such for early pickenian



Some suborities prefer to say that

when the SP is placed too close to PF has ficure in Fig. 11 (page 151, Nov. Average) where (62% is too alone 1 This new brings up to one lost one godin regarding the position of AF-

Inger shown 390, 500, and 506-in

investig the head and hy looking almost,

HE BIGGER THE CARGO PLANES THE BIGGER THE HANDLING PROBLEMS

* No . . . this equipment is not in production . . . nor does Whiting indicate that this type of loading (or top-or side-or any other type of loading) is the ulti-

. With a background of over a half century of material handling experience, Whiting is prepared to render a Collateral Kneineering Service that embraces the design and manufacture of auxiliary equipment in step with new operating

Main Office and Piner 1983 Lackney Ave., Horacy, 31

Western Office Stirt Science St. Commission Controlled Witness Commission (Canada) Ltd., Termine In

Western Office Stirt Science St. Commission Controlled Science Stirt Commission (Canada)

Main Office and Piner 1984

Western Office Stirt Science Stirt Sci

Fig. 28. Commer interior presentation of voters of a businer involve (Core 1, Median).

Alloys in ENGINEERING STEELS

When showings, plicon, monagenese, moleculescenturgeten, rickel, or werestom are added to a plane December on the offers added, and the amount, the steel is made structure, bearing harder more back. market and more correspond resident. Such steels are colled allow steels. When these weeks contain less than

cores satisfactory whatever for the standard allow However, because of service conditions in many apabreson weer is a problem, the small shad a flat

a problem in the selection, fobrigation, or use of an

ELECTRO METALLUXGICAL COMPANY

words. Worth Marylandinal Economy of Scientis, Switzel, Walland .. results

EXT Now York, N. Y.



Dwels ... Supposeting study may used for two-

-0.50% representation offers stead, and on us BUY UNITED STATES WAR BONDS AND STAMPS



Abulta Dale ... Engineering peak are used for



Electromet Ferro-Alloys & Metals

AVIATION No. 1941

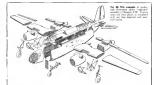
or Proof 5 in Prope 500 pierce, the

- reside) -

Fig. 21. Experients, Dissoul method for determinant stody to improve the accuracy

meters will be found time saving. Per-

MANUFACTURING SECTION





one system whether in crossped quarters or parrow aisles . . . it speeds things up and entirely eliminates straining, tugging, pulling, or extra pushing on part of trucker.

AUTOMATIC TRANSPORTATION CO. District Team State Co. It's.
Districted Team State company between as the

out loads from storage with lattle maneuverna. Buth exet power is evaluable so that so exits manual trust or pull is necessary to help the truck over too plays AUTOMATIC TRANSPORTATION COMPANY 115 M. STTH 51 MARKINGTONIAS COM COLOR IS ISSUE AND ADDRESS PROPORTION OFFICIAL AND TRACE

SHOCKLESS HYDRAULIC PLATFORM

LIFT WITH EASY FOOT CONTROL -

Production Speeded On Welded Seam Inlet Elbows

How Bairly medica new-type injet he country taking units formerly omeleved as power plants.



MANUFACTURING SECTION

Machine employed by Solck for conference accounts were welding of tables Sollie own to improve and form the toleray from step stock. Beyond lend weren parts at incoming the front brok. In cll. 14 elbows per on fed on from a coll of one ced. From a continued head which has to be mean of solly thought which for once parties. Then the regreed into to fed tology are done in a spread markins colle which product a continuous recoboilt by the America Mixtre France bears wild Flori is formed entries the

fieth former and welfer of the

Corp. Destudy, SAE 2000 strug steel

After leastly of fables have been been into alborn, latter on When forming in completed and fange has love shound of,



A lack of experience need not reduce inspection precision

class tolerance muck on the time-beneaut found sine green-and skilled impeasure are season, for that send not interfere with precision in year plant.

Substitute for the corner that results shift the number instruments which give yes greater precision and at the seen time electron the larger faces. Medicial problem gaging introment in the hands of insuperrienced inspectors are guarding product excitor in

bandreds of plents today. With fee description below him 43.1





· The eccurecy and high produc-tive capacity of Thomasse Grinders in hundreds of airplane and allied menufacturing plants is helping them to meintain rigid production The race of operation - all controls conveniently located

within easy reach of the operator - the full hydraulic conted of all head and table movements recoids a smooth shockless operation and high speed production. The Thompson Grinder shown is grinding vital eirplane parts to close telerances in the plant of a well known plane

Meeting specific precision requirements quickly — satisfactorily is Thompson's way of helping to keep more places

THOMPSON are hold in a full second of sizes from 6" x 10" x 18" to





THE THOMPSON GRINDER CO. ATTATION, No. 1148



VICKERS HYDRAULIC **EQUIPMENT**

bet plones . . . and on many of the machines that

Incorporated

1462 DAEMAN BUYO., BETROIT, MICHIGAN

This applieded where about accessibly compresses of both Fier-tedly PT H and PT-in cassed version of this webliv med-arrows income Proceeded deformative are that PT-PH in property

ps. with 75 % weeks added 500 by. Empty capacitation

SKETCH BOOK OF DESIGN DETAIL



revious major and manufacturing Decede AT 10 Forbine and

PRODUCED AND SOURCES OF DIE DESCRIPTION PROPERTY SPACE

Wherever our war planes for on all fighting fronts

of the world....Values Hadroofic Econyment is belying take an apprentise tall of the enemy. Victors Hydraulic Equipment contributes to the repensery of American planes. This high pressure

oil by dreadic expiratest is stordy and deposit life . . . appropriate to shack and velocities get hight to weight accounte and easy to adjust. Adminably sasted to air seeds and to the people of manufacturers as the around industry, Viskers

AVIATION, May, 1942 ALLIATION, No. 2042



SPECIFY

Opens new fields for Industrica

EROQUIP

HOSE LINES WITH DETACHABLE, SELF COUPLINGS

AVIATION, May, 1943



m or many chester restay, is really removably for

Plexiglas AND Crystalite

ARE ONLY TWO OF MANY PRODUCTS OF ROHM & HAAS RESEARCH THAT WORK FOR INDUSTRY IN PEACE AND WAR

IN the aircraft and plastics industries Rohm & Hass Company is best known for its development of PLEXICLAS and

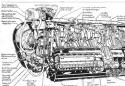












Senten view of Arman TG-5 Tremus Gisler showns method of specialist "spedens" which are designed to present staffing of control

ROHM & HAAS COMPANY



* This is a highly mechanized war. Its autoy any and



entered of problems have to be solved - middle! Their war job is the speedy divelopment and fast prodecries of highly mobile, Kehrweicht, considerely most, able correspondented engineers for me on all fracts. Wankenha engineers were given this war lob because their part experience inquired confidence in their shifter to do it. They had already developed signles resolve to-

and applied them to procetime purposes racrospish-They have the imprination, the increasity, and conplets furthers. They have not those off to work to Peace, when it comes,











-KAY, MAssis, DC, Essent



will bring more progress

kudo. They the products

of that service will be

mody for year postwar





CLASSIFICATION Denies-Meteries

ENGINEERING

Cold Bonding Tests Yeryma Conditions and Materials

TABLE In-Diedy of Studio Securities

studied 3 dy contractor, with order low-Promot: Clinical Section 2, the control of the cont

VALLE IL-Study of Study Secondary

1 to labor within their flavor of each part processes along value on Dicho (be Ger Z. eq. see, see Minist) and arrend flavor in pre-Symmet. Unavaire. Cli-550 applied on one form in each. Solids contain? 78.3 persons.

January 1. The refer of \$1 to 50 for highed mortains per Assemble, recess, blance, persons, and egong? Stone as 1,000 to 10 of size lines.

January 1. Of size lines.



"T"WO or more "Honey Been," connected to may constant posteriol set welding garaculor, moreover the mumber of welding area that can operate At the same time the "Honey Box" somers better welch on light gauge

metal - thanks to Wifton Bernote Coater Control, Craters, percenty and sampler delective welds are prevented because Center Control permits the Each control using a "Honey Bee" station has full control over his waking the net affect the unclarrance of any other "Honey Rea" stations working

surps. For complete details get in treath with your nearest Air Reduction valor. effice. A descriptive Iralistis ADW-47 will be forwarded on request,





AVIATIONS ENGINEERING

Cold Bonding Tests Versies Specific Pressure:

Specific present as per on affactor year as against. Assembly dose in diqued time after speeding other present over solute arm, With self-work, this openions arm, before present application, and may be office with

TABLE III — Study of Quality of Band under Three Vericibles. Mood Spaces, Pressure, and Assembly Time					
Species Contilled	Pressure Ub /w; m	Accordily Time			
		1 mag	5 min	15 min	25 ru
-		Percel	Present Wood Fadure and Quality of Boni?		
Fir to fir	1/1 29 69 200	16-C 56-TG 180-Ex 180-Ex	20 - P 50 - Es 100 - Es 100 - Es	99-G 69-VG 98-SX 99-G	30 90 300 300
Fig. to black Thillower in the compil so indicated.	1/2 30 68 200	165* 166* 568x† 3461	0-F 30-G 5-G* 35-G1	5-P 30-VC 20-G* 20-G*	30 30 3 3 3
For to pupier Failures off on the	1/2 90 08 900	50-YG 180-Es 180-Es 180-Es	90-0 180-15 180-15 180-15	00 - VG 86 - 10s 100 - 10s 100 - 10s	50 100- 200-
Popier to popier	1/2 30 60 200	180-YG 180-151 180-151 180-YG	30-0 180-15 100-15 100-15	90-VG 90-Sa 180-Sa 180-Sa	50 200 200 200
Popier to learly Endors of in popier	1/2 30 60 200	66 - YO 70 - YO 36 - F 100 - Es	100-Ex 100-Ex 40-G 100-Ex	30-VG 33-0 100-33 300-33	40 30 30
Tunk to bank	1/3 20 04 909	90 - Et 20 - G 0 - G	35 - VG 30 - Ex 30 - Fx	3-9 90-64 16-6	90 15- 30 80
"Parkers in book. "Parkers in both species		Sandless Very Good Good	1	- Fair - Poor	

"A realize notes of tests gas you was a 72 period with assessment with a district." Fresh among very dealy not

Subde assurer: 70 percent continuing dyested

Review of Patents By A. HARRY GROWELL.

Angelwed Patent County

U. S. Pricet Office. Mr Crowell will mate and and waveface to applying

Gan Metal has been designed so that

Early Among of a number of food

has each of elecation. The condition Lasting Gar. As improved television

inflatable rubber there, decired to not and momentalises of the co-school of

lifting effect of warp, and reduce stalling Sense Two apparatio above, "A" on legst

on this parties. When shoes are undeted.

Provided That. For relanding the open-

Arrest West, Structure of front and

officient modification of expension of a

Publing Arriags has aree, constructed



SNOW removed in a specialized matching total Fances ence proves that the first requirement is a said explosively and traction to push through heavy scows... therefore foll

making engineers. Evened, expected Weller Sense Behings on the product of

They clear 16 test widths, at overage speeds over 10 Wolter 4 Paint Pactive Drine, with three outomorie lack: ing differentials, Suspended Dauble No time is "Too early" to investigate

Merotare grove 54 decels



1001-19 IRVING AVENUE EIDSTWOOD, QUEENS, L. L. N. Y.



Another new super-colossal G-E training film

in "The Irande of Are Welding ""

supply, how to adjust the electrode holder and the PART TWO shows proper technique for making

PART ONE describes and disarrates the fundament oursest setting, speed of travel, see of see, see the YOU CAN BUY these films of print cost; that is, \$52,00 per part, or-YOU CAN BORROW prints for a single showing, without cost except for transportation

GENERAL @ ELECTRIC

ATOMIC-HYDROGEN ARC WELDING















Sealward in our writer for "The Incide of Atomic bedroom Are Weblies." Fort 1 and Part 2. Please reserve Parts 1 and 2 for our use an date Indicated



. B's all set. When the wor's goes, the

via Croe Hang-which would be out

ttill hoppes in exception's offices, the

ALLATION, May, 1940

· Not everyor selling what a more

more take with low communical Thurse's will make you find market desire them. gentle and more that they's species when they have to have my for printdiscovered on our less regular counts gradge. It's a lesson at least one other count top. B's this, the surbass hoven't - tremport medium could well fearn, one



titication staff since injures the spetters recrite.





... reliably timed with the W&T FLASHER MECHANISM

When the shore of Pan American Arrays's error Choper Seet come in they show the same familiar taillight flash mechanism which times this flathing red-white named on the Clippers is the relieble W&T unit, yest as it is on a

lacre majority of all our sirlines.

The span of a single right's fight sees the mechanism got through its paces. It meets wide changes in ambient merceted to withstand solvention. Reliability of operation

THEATH PLACETY SARETY





WALLACE & TIERNAN PRODUCTS, INC. PELLEVILLE NEW JEDSEY



SECTION

Subcontractors May Borrow Up To \$25,000 From Smaller War Plants Corporation

enn servant WPR offer rother than Makeny there hears rangingle to

umder feeried service effered by has present so respectivel to proce from

Men and Machines Available for War Work and skilled assessmentary resoluble to feeting budges boutles, AFLADON offers the other

Metal Work Facilities 5-144 As simulation environment manufac-

Officials report that company is pure 10-ft, roller dryang converter, there

Seve fiver space at beech or ess Provide more strength

follows: Presures 65 ton Blics No. 0 Constituted Offit, 40-ten Cirycland

LYON METAL PRODUCTS

with less weight. Mail courses LION MINA PRODUCTS, INCOMPOSITES

SAVE TIME

CONTAINERS

YOUR WAR PRODUCTION DIAS SUB-CONTRACTS MERE!

TIRE AN "ADDITION" TO YOUR BLANT

PEADY MADE and OPEN FOR BUSINESS Centrally located fully manned and committed from Druft. ing Boom to Shipping Platform-Day-Brits Lighting has the capacity and equipment to immediately become a

dependable "feeder plant" on metal parts you need to fill your war contracts.

EQUIPPED FOR STRAIGHT-LINE PRODUCTION

Sheet Metal on to 10 Gauss - Lengths on to 12 Feet SHEET METAL., Furnasa, rollino and weight a operations an all sheet metals. Extensive stock of reiling and PRESS AND ROLLING ... Proch

al spanney shocks FINISHING Systhetic seamed loking equipment. Viveus possible. ASSEMBLY ... Complete from her for

SHIPPING Experimental packing department and 70 levi of skepping digit on Terroral S. R. subset. DIES ... Facilities for Iterated manufacture of these and complete manufacture FNOINFFRING ... Ductical Trees neers, Emmerating Engineers, Tool De-signers and Drighman, Danian work on SPINNING ... Matel spreading equip-



DAY-BRITE LIGHTING, INC. S651 BULWER AVE. ST. LOUIS NO.

AR PRODUCTION

Sub-Contracts

SKILL and EXPERIENCE

PLYWDDD THRING

MANCHESTER, N. H.

Plumand and Wand Parts

one person with APECO can do the work of many

Making Cores of Azathine Written. Printed, Drawn or Photographed

our next pince of business, without delays AP+CO extrem upon up to U 337 1 to 130 repose or more No chance

FOOLEROOF OPERATIONS With our smalle instruc-

PROMPT DELIVERY ... on machines and applies Leave have others as your deal have benefited, With for PROZE AMERICAN PHOTOCOPY FOUIPMENT COMPANY

Peet AH 4 Chierre, Illinois

SPECIALISTS in preforming and PLYWDDD ANGLES PLYWDDD CHANNELS

30 in April dynamic belowing machine;

need EXTRA hands?



A CAPARI F DRGANIZATION Wood, Metal, Febric......\$147 Investe annels forgoes are your regularments promotive and falsely. Now producing welded serrigh forgogs for sirroft

and widely of minder morehhor-



Instrument Approach By Radio Direction Finder

By C. H. Maintosh San Ciri Samba Asses Action Asserte methods of approach by loop direction finder, using pendirectional radio boscoss, are new of prime importance in aircraft appreliant abrend where familiar radio resons are absent. Here onwind to mederate-wind conditions are covered. Higher wind conditions will be considered in Part II, to follow is an early issue.

I's survey than the investing with bowers, non-directional radio become about of radio direction feature are common resistant and on the appreciation of the nampatoonal po-ti- stratal approach hittin of cube D. F. Mary of these

seldow recovered these mountablesse

red on over larger number of polets only DVF approach propalate for that even, Nov. 1 is covered in the sager function radio reages are either non- all surports. Defeate represent altriples excitant is an across an to be seldon, must be set up far each expert. In all D/Y propries, are hard topen as

most with one convers 5,000.0. Longrenews, the direction of final approach

above are necessary. In half wound,

tedered to fit an arrest, at a possible

General D/F Appropria Mathedy

though both Steps I and 5 speculed

redore will be explaned

A. ishlini Approach

teen a constant width nell. Every st-

4. As vertex is closely approprietly,

surplane slows so that surpre will be all



Fig. 1. Series presedure—as wied,



No. 2. Issing precedure—namposesting for wird



payment mobben for few orders con-

SPARTAN

- wherefedeed the top-roadity packing leather Gration & Kought's enclosure "combination



this test stand", amounted perlyans Continuous operatural cycling tests made to this user, at pressures up to 2000 yea, determine the manufactor of our purpose.



PERFORMANCE AT SUR-ZERO ENDURANCE UNDER HIGH TEMPERATURES? TEMPERATURES?

a thight change in agreement





a like, 15, 1943, year \$3,000 pay of



faffe opened by All Assessas Avenue, he

rome of the problems with which the

I. To defer a fooler siring.

type of operations which might he pet twicing a position on the matter

industry and CAS face fear major decisions is development of new pepulation with the primary or trank As lowr uso or PASS, B. E. Cale.



By JOHN H. FREORRICK Ph. D. and vital part of notion's postwar treesport system.

A seen on the war is over and . No hearings had been held on up a consument and sumpower upon plications for strictly fooder article. stone available for connected it appreliant artificial more than a radi ands until after the close of the way.



CAC defection on attenual is here

The first two defections explicit-

nould never too greenel. Whether or

Social angiouses for feeder the exception will us ... special from our code such as fine Principle AT 14 Render Deceiv see being replaced by the sufficey as







NEWEST TROOPSHIP

Organity described to whick \$5 per- | with any other brend. "Constellation" new is the World's these Constellations will be TWA's Nor only TWA but more other lasportant nichten enjoy safet, mere Oil and Aviation Garoline, In fact.

ferred in meny other important detele, a few of which are listed in A Terrory Assistant Resonant will gladly cooperate in the selection of

oble at leading airrosts in the 45. distribution point, or write The Toxes Company Aviation Distance H. S. are flown with Texaso than 135 East 42nd St. New York N. V.

TEXACO Lubricants and Fuels

THEY PREFER TEXACO A Mora Direct beauty-over on attenue-hand practs in the U.S. in tuboccosts and Venne than well off other branch A rise Description with possed in upon

low, requiring incensity and bord

work - plus Mara's how the Flaride Embry - Eiddle School licked shortones of men, more-

An eld Medel A Ford sweps, stripped of

FOR THE AVIATION INDUSTRY TUNE IN PERD ALLEM SYSSET DEMOKE MIGHT-COS * HELP WIN THE WAR ST RETURNING EMPTY DRUMS PROMPTLY



rings. With the few unbecome its necsound, we note able to notice Mr. Graffin and a group of men who had

testament to hard work, income

Wanter calved see of labor problems. Starting in immeriars, they were seen and in



Your Moral Help. Your Money. Your Time.







sector direction of Charles Police, who drawn





Making Good Machinery Better!

special motors for special jobs - working - helping make good mothinery better.

No matter what your electric matter problem or requirement may be, we invite your inquiry - and ossure you that your needs will receive our prompt and coreful attention

The motor illustrated is our TOTALLY ENCLOSED FAN COOLED Don't Proof motor - which is available in a wide range of electrical and mechanical medifications

THE LOUIS ALLIS CO., MILWAUKEE, WISCONSIN

How Heaters are Made For American's Flagships



for bredien and weldien of steel tabing are above at work in the manufacture of the sirling's finaltube boiler.

At imparious reactes of constructors A stands below the suppless bodies desired by Asserting Airline' care take, whose sude are use welfed sets general, we start with straight aschaus short learthy become every wises next

Fig. 2. Catting (by. dragged for alcoairy







Fig. 7. Welding Storps and neller for these terrocutes. Elevate







rang to at them water smilet at lacitors



conditions, and this is immortant because thick, dense turff. Keeps down dust which is a couse were and party evolutionals. describe redefall, prevention muddy areas and the danger of

Heips eliminate hazards of lease stone, cravel, etc., Injuring propellers during motor revupe, toke offs and loodings

Heins abjustate wheel marks which can be chata annoted from or Not or 30,000 feet

Weetington was the first to study the new problem of our curring on the vast Aufield accesses A revove pulleng a 0 grage Mower current a sweet 21.2 feet at a speed of 15 males as hour will





NOTEROOK Ortest Collinator of Pan American

AVIATION'S MAINTENANCE

· Descript and but for Joseph Person, short of bought for about \$50 carls, total cost being well



Chicago & Senthern

AVIATION, May, 1843







thousing in the heat of buttle, production delease Pacif Megnetius Corporation, enquestors of temperature methods to inducets pephablic

nement Magney's fluorescent series at which keophies the model by all unfo-priors is an estate-cine exemple. Your company will find in Megnellux

NAFLUX CORPORATION 5108 Northwest Highwes, Chicago PATTERN . LAN ABOUTT

AVIATION, May, 1945 AND LATION, Nag, 1943



Chicago & Southern Engles Nacelle Starage and Sverhaal Stelly · Regions in for overhead at Chicago & Scotterio



ANDATORNA - MAINTENANT

They're flying with it today . . .



The elliptical oil cooler "that couldn't be built"

As ellipsied chape oil construction confide t take it Addressed recinery configurable sped a special wethod of pressure known and hoped for BUT-oil streamy ... put the nex oil cooler modern must authorized acrellic reco-

Affloward Distingt Oil Coolers This was design makes more the else conveying places. Eliginates wants

And could it take ft! Passing the

space Provides arrater cooling of ciency. Only one valve and et line AlBerrarch Effictival Oil Cauley.

are offered to all U.S aggraft manofseturers A number of sizes are available. If you see working on new

true, the AlBerrauch design met all Boucks the off cooler that couldn't

tout flep bond in PAA Shep · Bereloced by A. P. Peris, chief of currer combant

In I place bloom

AVIATION ATTAINED S



Menter Technology Yest Name of TWA

. For finding as men as four technoster generators and sub-

craft magneto spersing at about L909 year, free



him, Mrs. Smith!

-but we'll need the full cooperation of every steel fabricating plant to do it

Men Smith-en majde ynd'n Men Kolly in Calona ar Jankensky-ei mahn ne defferense, hannese ande af yen han de de fe de armed feren af war einstry until se wanter? It 'e want all af chem is come bene ristorious --and affe-joint account of year einstry

It he en Gardaliavad, in North Afrika, in Australia,
an Indiad, Min. Sandh' Thai's where our leys one, too,
one him
You an, disonated here goed from the milds, resists and
objects of the steel tradestry forest them 15,000 from
Electric Republic already. Thousands more in version are more or
heathers of and workers.

EVER.

Fabricators MUST segregate Alloy Steel Scrap—or schedules may COLLAPSE!

Alloy seek causet be unde without sixtal, chremom, molybelenses or other chircal alloying elements. And such materials are searce, promiting searce every day. There Just incl. enough to go around now. So what about the future?

Here's what' We must reclaim every possible ownce of olloy from seed steep. Every time you machine allow reeds, submarried

quantities of allaying demants go into the errop plat-Bit nation you know each lot of a life most chap, manings, theseings and other term operates regregated a the machine sed our erroly labelled with its grade auchine (SAT, AISE, NE or other), the assumes value of those alloys may be wasted, even lost.

To charge strap of anisotions alloy content a farmate may mean possible loss or waste of the alloys—possible runs of that hers of steel —certainly, disreption of melting schedules On the older hand, the only way we on cheer mine the alley occurrs of metel, consisted. oto kelp...ky formishang enough of the itemp, temps alley stock would be produce the best, the safest fighting tents in the world for your bay Bat...to do to, WE MUST HAVE THE FULL COOPERATION OF

EVERY STEEL PARRICATING PLANT

Steel Scrup — or schedules may COLLAPSE!

am, arrap is by melting it down and pouring is into lad ages, wasing the time of furnace and skilled by every which should be producing unble seek, but Chesion and mostlermus man take use to analyze

Chemion and menthergate must take time to analyse the ingent to determine when and have such alloys they contain. Triality, the strap ingont must be remained again when the desired analysis is being produced. That is waste of materials, manpower, they—couly wisse.

We have you're horse-that you have many problems.

-BUTTHIS IS EQUALLY IMPORTANT—not can be taken care of an abusey; but take a few adminisright more in income coder to your plans to reprogue alloys used acress, more in correctly and resure is promptly. While you've to it, make a sense one empositible for checking at least occe a week on me that your other in being carried out-

act the year own is being current out-You'll help protect Mrs. Smith seemore your own see-and, incidentally, the American System of Four Emergeise which made your business possible.



EPUBLIC STEEL CORPORATIO

Allay Steel Division Soles Offices: Mossillan, Orio - General Offices, Clevetoral, Orio

Berger Manufacturing Directon - Culture Directon - Nika Steal Products Directon - Steal and Tolors Discusses.

Lived Directo Distins - Traccos land Company - Vaspon Directonest. Chipter Biology, New York, New York.

De Comparation with the U.S. Generalized Special Company Companying

Paster the register of this determinant and note to the U.S. Generalized Special Companying to the Company of this determinant and note note that the U.S. Generalized Special Companying the Companying of this determinant and note note that the U.S. Generalized Special Companying the Companying of this determinant and note note that the U.S. Generalized Special Companying the Companying of the Desire Companying Companying the Companying C

WASSED MIGHT ...

Predictions in heft and brewn, supreme in speed and punch, squadrons of 2,000-h.p. Republic P-47 Thursderbalts excel in sheer destructive power. No altitude is too great, no enemy too fast or too strong, for these stalwart



Designing Gun Turrets as Integral Part of Aircraft Part II

by L. G. FRISE





leter development stoges of Bristel power-operated turrets.

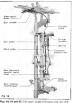


Em. 12 First retrestable counts to be enterled on a productive smooth. Bedevice all dug ther obtained in

MILITARY

Detailed drawings reveal solution of many problems excessfored in

REPUBLIC AVIATION Terrescore process at the British school is looking out, extend of save-







Tools for Bombers

IT'S dask space. Bombers are band upon front of hangers ... crews at above stations ... exceptly aged notion straining for the take-off ... exceptlying

medication . . . befored do it markly . . . reade. Worsehos and sackets reproved places with case . . . server drivers, where other BONNEY TOOLS all placed With tens of thousands of engines produced by lendant assemb service



BONNEY FORGE & TOOL WORKS, Allentown, Pa.























control lie acresal rivercite tagest are of feelble hand the corner ber finde an gaussers around ables of d skan inversing. Game prograds corner with them.

reg. Gove protroft through famile band, we seen.





Every one of us at Thomas &
Betts was honored recently to
receive the Army and Nery "E" Award
for outstanding receives too at War

materials.

As a company we are proud to fly the flag. As individuals we are proud to wear and treasure the "E" lapel pira.

wear and treasure the "E" lapel gins.
We feel an even greater honor. That
is, the privilege of making unspectacular but essential electrical fittings for
the War machinery used by our hightree men on land and see and in the

air. Our supreme honor is the opportunity to help our armed forces win the War.

And so we cannot rest on our laurels.
To us the Army and Navy "E" Award says. "So far, so good but no farther.

id do better."





ANDPACTURERS OF ELECTRICAL FETTINGS SINCE 1889
FRIZABETH, NEW JUNEAT
In Course Thomas & Edit 188 Manteni

There's Stamina and Performance

Pinton Stani POS Capitan Dine Hardened and Ground Perts

McOUAY-NORRIS ALTINIZED

PISTON RINGS

PISTONS PINS HARDENED & GROUND PARTS

McOnay-Norris, a pioneer manufacturer of parts in

he automotive field, is devoting itself in increasing magure to the aviation industry. Our Aircraft Division projects the McQuay-Norris policy of elinical research into this important field with the result that we are continually adding to available parts, technical assistance and research experience

Your inquiries are invited.

EQUIPMENT PRO STEMPNOE OF AMECIAFT

PROPELLER, ASSESSED

d Massesive Perts

NOING GEAR PARTS Sachinal Absolute Pisters

Herdened and Greynd Ports

PRECISION WORKERS IN IRON. STEEL. ALUMINUM. BRONZE, MAGNESIUM ACQUAY-NORRIS MFG. CO. (AIRCRAFT DIVISION), ST. LOUIS, U.S.A.





No. 23. Hedronic preparator derived to refere such leads downs servinged torque or moving gran specied. It is simply proved



Fig. 24. Switzel Joint which has found many applications, both on



Easy does it

is realized other Booms tobs resire : . smolfrier countains in they droven shorages of skilled weeken, production corplesse manufacturing philinophya smole device, but it (flustrate the pear the Sorrar-developed which perulation dolls, by more of which and ades of Energ Fleing Fortunes." The wheel, held firmly on the dolly be eductable arms, is rolled into nonzonthe didly are would back and the

This is but a simple councile, and only one smost handards, of the conand Brazze, Westerston, Wichele, Kerbecoved took and handken community

twenty for different engineering fields, And in the successor is owner these on effort which has conveniented to

ROFING PERSONNERS OF THE PLYING POSTERS - THE CLANICATION - PARK AMERICAN GLIPPES

Yank Modification Center Rises in England





BY MYLES V. CAVE. Audious Adds Communical First story as assessing of warting "Little America" where showing

dictated by letest bettle experience are made as AAF warplanes by Leekheed Aircraft subsidiery.

An idea of the extent of the present and the ement of overgoest handled

office. This prayest, storted less than a

Liberatory, Lockhard Pills Liebtoness.

On behalf of the Army, Loddson Owners headles my modifications and from an increase in convention came. special missions. In saffice, a nel-Oce-May- Boary Onder devices ber

the worker was eigen an exponentity to

the last or staffed by handreds of Look number the various units of wheel of m potential in its mobiled part of the 3-20 Branes, C-67 Shippoins, Book slow progress. Heiber at suffernies the dy. This, despite the fact that latest. when the read helding progress

in fight. Mr. Derso-bear as about staked as almest crumous clus in the

on a pieze. The department dues, have

(Fare to page 450)

Gets into tight spots!

LOOK at that O.D., and you'll know who Apex and action out ions and precision over as the bands of consistent workers. These simple. body despeton for their expenses. They are extremely easy to adjust for posser advantment in service. Sample

design plus ample raggedness and toughness make their fire tools for rither hand or report arelications. Four different sizes will set made up fermie sonare drive shoeles, or conthi auton T-hardie with ferrale square for me with a toyone wrench Write for Bolletia No. 101 for all the faces.



Americans of July Forlin Toppin Cooks, Dank Change and Pasitive Dire S.E. Cooks, Varied Free Toppin Chairs, Pasitile Freetra, Said Helder, Proce Str. Sr. Pinitar, Street Freetral Cooks Name Service, March Levi Levi Helly on Carbon Land Serve, Month Uni-head and Cabb Name Service, March Levi Levi Helly on Carbon Levi Serve, Month Uni-





Velvetouch Dependability is Established

au TWO FRONTS

VELVETOUCH Printers Materials are doing an outstanding job in many applications on America's combat planes, neighly in landing brakes and in the clutches on engine apperchargers, gun tures mechanisms and wing flep centrels. On the bema front, too, this miracle of powder are unusually severe . . . in earth moving equipment, in marine and industrial machinery, in all well and coal mining equipment, in trucks. busies and agricultural implements. On land and in the gar,

energings of clutches and brakes.





"Mosquito" Design

Facilitates Production

By JAMES MONTAGNES, "Andrews" Constitut Communication With plywood foreign constructed in investigate height, exercil and ables betelletters are coulded by Heatherd Alcorett of County uses Poskarddailt reniers in ernfusion these formidable creft.

road sheets had over a expecte form. Figure obey on erenting the please or

FLYING EQUIPMENT

terms etca or inciding do therfined Men

o. as integral part of the foodage of







AVIATION, No. 1941



POWDER METALLURGY TO WARK FOR INDUSTRY

AVIATION, No. 1945

and mantach have been installed below the lengthwise halves

it can be

The number of moving parts in any mechanical assembly is an Important consideration. A reduction in the number of ports often means greater efficiency in operation and lower cost of

production. That's elementary knowledge to every manufacturer. but many terms the manufacturer is too close to the woods to see the trees. He's grown up with his product and is cominced that it is just as sireple as possible. Spriesch men have amazed many experts by lastisting it can be simplified. We've done it with highly complicated, precipion dereasting arough arrestment devices such as automotic bamb-valouse racks and shackles and

conson feeds-As a matter of fact, that's why Spriesch now is working 24 hours daily, producing this highly specialized createrial -delivering it on time with a remarkably law percentage of rejections. Spriesch

proceed was production in the talk of the country. Prenkly, we seek egetost now with responsible people who desire to improve present rechanges... to develop new mechanical ideas ... to produce parts or complete essemblies, experimental or mass production ... AFTER VICTORY. Our 36 page brockure

"legerulty" will give you a complete picture of our physical plant ... at the same fine will portray our spirit. Joseph J. Cherry, President.



Established 1923

TOOL & MANUFACTURING CO., Inc. ET . . . BUFFALO. NEW YORK



back, and other prets, ere installed alon after the expendented effects

Subsection Late Some Marks We what

opening with the appear part of his

Converged, 2000 wt | Agreement for

Real exceptly sets of its Strilland Ac-





AVEATION, May, 1940



seasoned, dependable source NEW- because Oster electric motors, now doing their part as power units in vital war instruments and mechanisms, had not previously been offered in the market SEASONED ___ because Ourr has been building simi. for motors for 15 years, exclusively as original equipment

DEPENDABLE - because Onter's peacetime requirements have always called for the very qualities which are essential in war applications: Light weight, maximum power in minimum space, precision



for its own appliances.

manufacture, ability to stand up under abuse. JOHN OSTER MIG. CO. of Illinois

CINCA ILLINOIS





Here is proved ability to produce viscosis wing space, wings, face, flaps, radders, stabilitiess, pulot sexts---trideed nearly are structural section---quickly and in volume. More than two years of war production . . . more than fifty years of fine craftsmanship in

wood and metal... makers a accounted approach to any production responsibility you may wish American Sessing Company offers the success industry: O SLEXIBILITY proved by swell do subspecies and produced and not not be to be

WORLD'S LEADER IN PUBLIC SEATING

dies Santon . fromb Offices and Distributors in Principal Cons

ATTACTION May 1943